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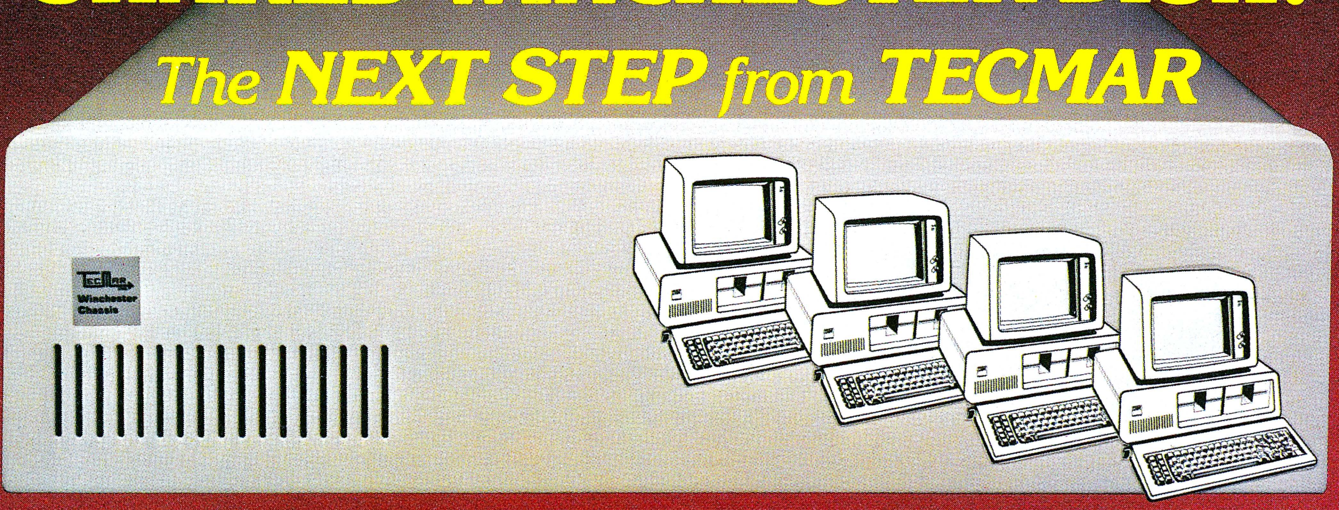

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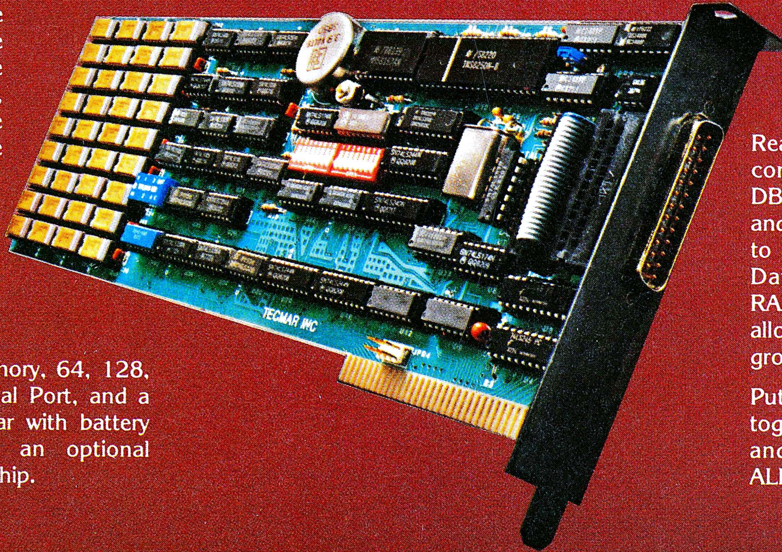

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for the IBM Personal Computer

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Cover: Photo of Al Kaplan, P.I., Las Vegas, Nevada, by Kurt A. Wahlner.

Credits: Composition by Photographics, Hollywood, California. Printing by Volkmuth Printers, Saint Cloud, Minnesota.

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Postmaster: Send address changes to Softalk/IBM, Box 60, North Hollywood, CA 91603.

Subscriptions: Complimentary trial subscription to all owners of IBM Personal Computers in the USA. If you own a pc, but you aren't receiving *Softalk for the IBM Personal Computer*, send your serial number and mailing address to Softalk/IBM Circulation, Box 60, North Hollywood, CA 91603. Non-pc owner subscriptions: $24 per year. Back issues: $3. *Softalk for the IBM Personal Computer* is totally independent of International Business Machines.

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crosstalk

Friendly—Forewarned and Forearmed

The comments in Bestsellers in the October *Softalk for the IBM Personal Computer* concerning FriendlyWare, program piracy, and copy protection prompted me to offer some clarification and perhaps an apology to the many fine Computerland stores that may have taken offense at the article.

First of all, I'd like to point out that our dismay about the piracy that we expressed to you, and you in turn passed on to your readers, was in no way a blanket indictment of all Computerland stores. We enjoy a very good relationship with both Computerland corporate in Hayward, California, and the vast majority of operators throughout the country. We owe a great deal of our success to both the main office and the Computerland store owners, managers, and sales personnel. We've found 99.9 percent of the Computerland people to be totally ethical and a pleasure to do business with.

But just as our success depends on the grassroots efforts of the store personnel, we can be measurably damaged by any negative activity at that level as well. Unfortunately, we've found both to be true.

Before we shipped our demo packages to the stores, we discussed copy protection and decided to do a little in-house test. We displayed our phone number on the final screen of one of the games on the package and asked the player to phone us. The particular game involved is rather difficult and requires hundreds of moves and a good forty to fifty minutes to complete successfully, so it was unlikely that someone could play it to completion in the store. Remember, the phone number appeared only in the demo sets, not sales packages.

Before we had even shipped the first copies for sale, the phone started ringing. We received about twenty to thirty calls, and several of the callers readily admitted that they had a pirated set. The kicker was that there was a geographic pattern to the calls—most of them coming from specific locations around the country.

When we followed up with inquiries to the retail stores in those areas, we were shocked at what we heard. Such activity, we were told, was no big deal. It happened "all the time."

Apparently the theory was that if a customer wanted the FriendlyWare *PC Introductory Set*, the store wasn't about to risk losing a sale on a $3,000 system over a $49 software package that was unavailable at the time. One dealer admitted producing and giving away "about fifty sets." Of all the suspect stores, he was the exception rather than the rule.

The primary point I want to make is that the whole attitude about this subject starts with the retail dealer. If the salesman hands the buyer a couple of disks with a grin and a "Don't tell anyone where you got these," what's the customer going to think? He's going to figure if it's okay for the dealer to do it, it's okay for him to do it as well. Chances are when he gets home he'll make a few more copies for his neighbor and brother-in-law.

The retail dealers are ultimately responsible for the attitude about copying and piracy that the customer takes home with him. As you said, in the end everyone loses.

FriendlySoft has indeed decided to copy-protect our two new releases, *FriendlyWriter* and *FriendlyWare PC Arcade.* To soften the blow, however, we intend to introduce a very innovative and attractive guarantee on the master disks, and we are examining several other options in this area. Our objective is to find a happy medium between protecting our investment and livelihood and maintaining fairness to our many customers.

At any rate, I wanted to clarify these points and applaud you for being one of the few publications to address the subject. I hope you continue to follow up on it.

Michael D. Yaw, FriendlySoft,
Arlington, TX

Reader in a Ruffle

Talk about revisionist history! I'm referring to the September 1982 issue of *Softalk for the IBM Personal Computer*, specifically the articles by Allan Tommervik. Here are some facts about the history of UCSD Pascal.

Roger Sumner was the key technical person on the UCSD Pascal project. Starting from the Zurich p-compiler, he single-handedly designed and implemented the original UCSD Pascal compiler, filer, linker, operating system, and interpreter. The only part of the system not developed by Sumner is the screen editor, written by Richard Kaufmann. It is worth noting that some of UCSD Pascal's most useful features were implemented over the objections of Mark Overgaard.

Academically, UCSD consistently ranks among the top twelve campuses in the country. The computer science department suffers only from lack of breadth—not the lack of quality implied by Mr. Tommervik.

I am a UCSD graduate, former Pascal project member, coauthor of the Apple Pas-

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cal interpreter, former member of the UCSD surf team, and former employee of SofTech Microsystems. Of the eight Pascal project programmers originally hired by SofTech Microsystems, six have left. The remaining two are presumably the "young clucks" mentioned in Mr. Tommervik's article.

Richard Gleaves, Del Mar, CA

p-Soup and Baloney Sandwich?

After reading the comparison of IBM Pascal to the p-System I was very disturbed by the bias shown by the reviewers. For almost a year now I have been working on a property management program. I started it on an Apple III using Apple's version of the p-System. The Apple III proved inadequate for the job. I then moved it to the IBM Personal Computer, choosing IBM Pascal over the p-System. Since the program is in excess of 200K, I find it hard to believe that there is a 64K limit on program size using IBM Pascal.

There are several reasons why I chose IBM Pascal over the p-System. IBM Pascal is inherently faster than the interpreter-based p-System because it compiles to native code as opposed to p-code. Whether the speed difference is significant depends on a lot of factors. However, for this application I wanted the fastest code possible.

PC-DOS is far more popular than the p-System. Hence, a royalty would have to be paid for each installation using p-System, while it is likely that an IBM owner would already have PC-DOS. My program also dumps financial reports into a visiclone-readable format. I know that under PC-DOS, *SuperCalc* can read the file that is produced. Since p-System and PC-DOS disks are incompatible, I'm not sure that a visiclone program is available for the p-System. Finally, hardware manufacturers are introducing new products at a dizzying rate. Invariably, the product is introduced with either a PC-DOS driver or a CP/M-86 driver, with the other system's driver soon to follow. Offhand, I can't remember when I saw a new product advertised with a driver for the p-System available. I feel, and I am sure most other programmers will agree, that I don't want to write, and I don't want a third party to write, a device driver for a new product.

Finally, the portability of the p-System is, to me, a lot of baloney. I may be wrong, but I would be very surprised if a text file on a disk created by an Osborne p-System could be read by an Apple II running the p-System and an IBM running the p-System. The Universal Medium notwithstanding, another incompatible data format is just what this industry needs. As for object code portability, my program is very screen oriented, liberally using menus and forms. Since the only p-System screen function that I am aware of is *gotoxy*, either additional assembly language functions are required or extremely slow Pascal functions have to be used for screen handling. Thus, the program winds up being slow and portable, or fast and machine dependent. This is not to say that IBM Pascal has screen handling functions—I have written several procedures in assembler that are very fast screen handling functions. Since the program is in 8086 machine language, portability is not an issue since it makes no claim to being portable anyway. Anyone interested in these procedures can contact me through Crosstalk.

W. J. Rust, Omaha, NE

Adventuring in Black and White

In response to Jeff Spahn (September Crosstalk), your Infocom game is trying to output color on your noncolor monitor. The simple procedure that follows will make *Zork* run in black and white, thus eliminating the problem. All future versions will ask you about your monitor, and adjust accordingly.

About one second after the bell sounds while booting the disk, strike the "8" key. A few moments later, in the upper-left corner of the screen, the letter "U" will appear. When this happens, type *70*. The letter "N" will then appear in the lower left. When this happens, type *07*. The game will then run in black and white.

Please accept our apologies for the frustration that this problem may have caused. We are committed to customer satisfaction and will continue to make every effort to ensure that our games provide a high degree of enjoyment.

Gabrielle Accardi, Infocom customer service, Cambridge, MA

One Way To Avoid the Mouse

I notice that a lot of people are concerned about underlining with *EasyWriter 1.0*. I have managed to solve that problem by installing Graftrax Plus on my IBM MX-80 printer.

Underlining is turned on by typing the "underline" character (over the minus sign) and turned off by typing the "wiggle" character (over the reverse apostrophe) before and after the word or words to be underlined.

The capability is set up by embedding the following commands in the document before the first underline:

.user1 (underline) CTRL O ESC (minus 1 (enter)
.user(reverse apostrophe) O (enter)
.user2 (wiggle) CTRL O ESC (minus) (reverse apostrophe) (enter)

This capability works neatly and is much easier to use than the Mickey Mouse scheme of canceling line feed and overstriking the entire line.

John E. Morse, Rochester, NY ▲

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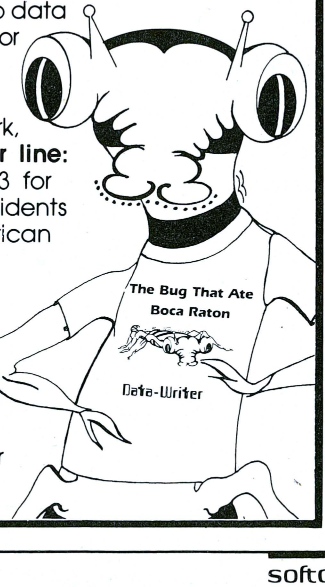

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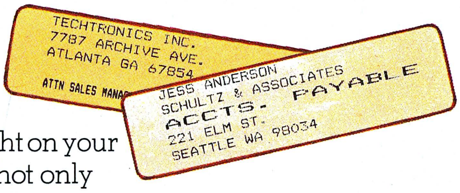

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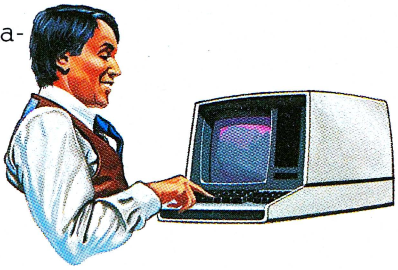

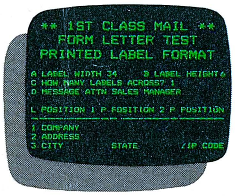

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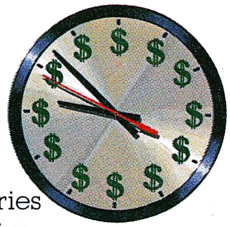

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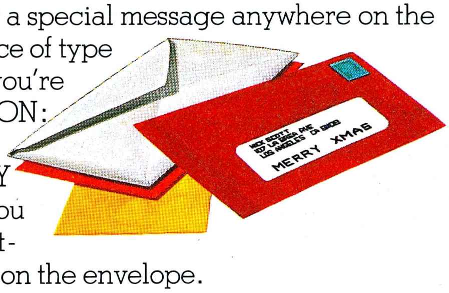

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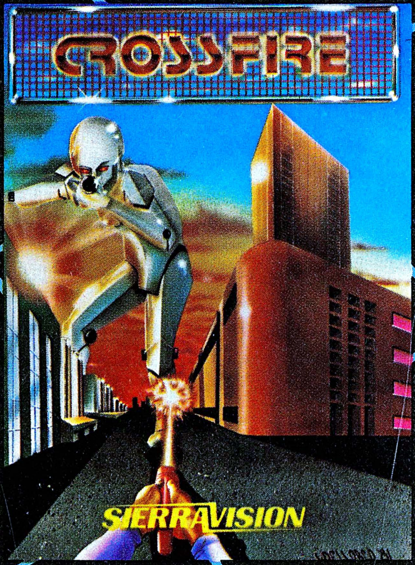
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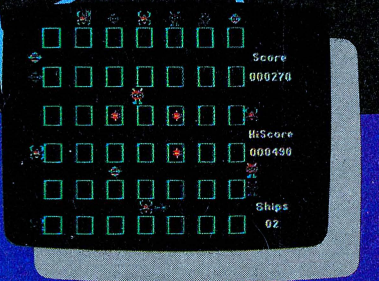
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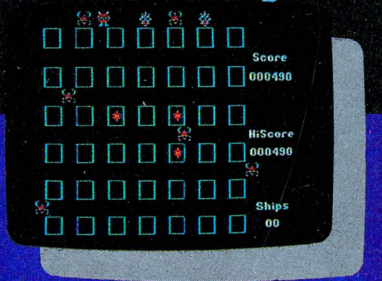
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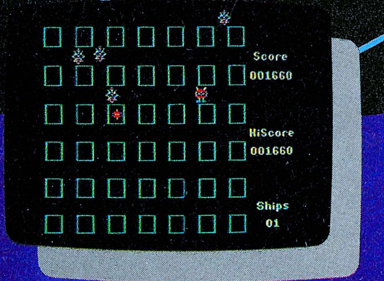
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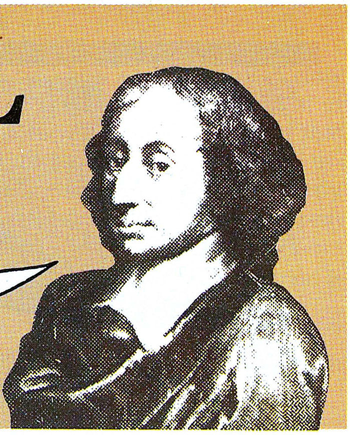

by Bruce F. Webster and Deirdre A. Wendt

Things are always at their best in their beginning.
—Blaise Pascal, *Lettres Provinciales,* no. 4

Stop! Before you turn the page, consider this: in just ten minutes, you too will be able to write a working Pascal program. Honest!

Think about it for a minute. Haven't you grown a little tired of listening to that friend who casually mentions enumerated data types, *case* statements, and *packed records* with tag variant fields . . . then looks at you and says, "Oh, that's right, you don't know Pascal"? Wouldn't you like to know a few buzz words to throw back at her (or him)? Wouldn't that make you feel really good?

Well, stick with us and you'll reach that goal—and maybe a few other goals beyond it. Who knows, you might find you really like Pascal. Stranger things have happened. And you'd certainly find it satisfying to drop a listing casually on the desk of That Programmer, along with a comment like, "Thought you might like to see this. It's a modified version of the Shell sort algorithm, using a linked list of dynamically allocated records with three levels of nested tag variants." That would make her (or him) sit up, take notice, and maybe even ask you out on a date.

A Quick Example. Enough of the hard sell. If you're still here, you're probably going to stay through the entire column, so just sit back and enjoy. Right now we're going to make good on our promise to have you writing Pascal code in just a few short minutes. This, of course, assumes that you can write—or at least follow—this simple Basic program:

```
100  REM    SIMPLE BASIC PROGRAM
110  INPUT A
120  INPUT B
130  C = A + B
140  PRINT C
150  STOP
160  REM    END OF SIMPLE BASIC PROGRAM
```

This program allows the user to enter two numbers, which are stored in variables A and B. The two values are then added and the sum stored in variable C; then the contents of C are printed.

So far, so good. Now comes the fun part: converting this innocuous little piece of code into a real live Pascal program. We're going to do it a step at a time, so you can understand what we're doing and why.

The first step is to remove all the line numbers, since you don't need them. In fact, even if your Basic program had *gotos* or *gosubs*, you'd still remove the line numbers, because Pascal has other ways of getting around than jumping to numbered lines. Our program now looks like this:

```
REM  SIMPLE BASIC PROGRAM
INPUT A
INPUT B
C = A + B
PRINT C
STOP
REM   END OF SIMPLE BASIC PROGRAM
```

Next we must change the names of the I/O (input/output) commands. Instead of *input*, we shall use the Pascal procedure *readln*, and we shall replace *print* with *writeln*. Now we have:

```
REM   SIMPLE BASIC PROGRAM
readln(A)
readln(B)
C = A + B
writeln(C)
STOP
REM   END OF SIMPLE BASIC PROGRAM
```

Three changes are next. First, we replace the "=" in the fourth line with ":=". Pascal uses ":=" for assigning values and reserves "=" for comparing values.

Finally, we eliminate the command *stop*, which is not needed or used in Pascal (in fact, it isn't really needed in our Basic version either). Our program has changed some more:

```
REM   SIMPLE BASIC PROGRAM
readln(A);
readln(B);
C := A + B
writeln(C);
REM   END OF SIMPLE BASIC PROGRAM
```

Now for a major change. In Basic you can start execution on any line, selectively execute groups of lines currently in memory, and so on. In Pascal, a program is a well-defined group of instructions within what is known as the *main body*. Execution always begins at the start of the main body and proceeds to the end. So we need to set up our program and place our instructions in the main body. When we've done so, our program will look like this:

```
PROGRAM simple(input,output);
BEGIN
REM   SIMPLE BASIC PROGRAM
readln(A);
readln(B);
C := A + B;
writeln(C);
REM   END OF SIMPLE BASIC PROGRAM
END.
```

Undoubtedly you've noticed three things. First, the *program* state-

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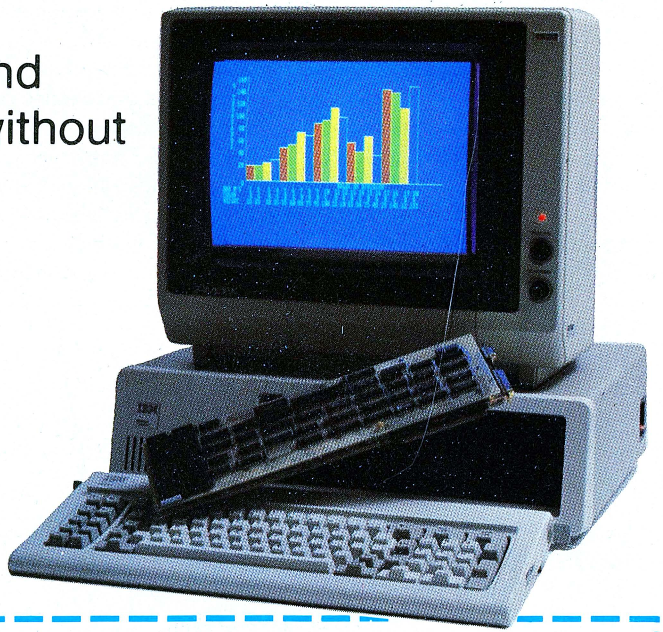

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Pixel Sharpener, PC+and Colorplus are trademarks of Frederick Electronics Corporation ment has three identifiers in it: *simple*, *input*, and *output*. The first is the program's name; Pascal programs have to be named. Don't even worry about *input* and *output*. Ignore them. Don't even think about them. The last thing you need right now is to be confused or scared off by mention of f - - - s, so just pretend they don't exist. In fact, many Pascal compilers allow you to leave them off (in other words, we could have just written *PROGRAM simple;*). We'll keep them on just to ensure that our program is Standard Pascal, but don't pay any attention to them.

Second, the *begin* statement has no semicolon after it. Why? Because *begin* is not a statement. The complete statement is *begin . . . end*, with any number of executable statements between the two. Not only that, but a *begin . . . end* structure, with lots of statements inside, can be used anywhere a single statement can be used. This isn't crucial for you to know right now, but it will be important later on. To recap: the complete structure is *begin* (statements) *end;*, with the semicolon coming after the *end*.

The third thing you've noticed is that the *end* that terminates our program has a period after it instead of a semicolon. That's not a typo; it's just the way Pascal signals the end of a program. This is the *only* place in your program where a period should follow an *end*. If you put *end*. anywhere else, you will either lose part of your program or the compiler (more on that later) will give you an error message, saying "Unexpected end of program."

On to the next item. Pascal was designed as a teaching language and, like most teachers, tends to pick nits (but only for your own good, mind you). Case in point: Basic allows you to create variables as you go along, while Pascal demands that all (and that means *all*) variables be declared before they can be used. "Declared" means that each variable must have its name (A, B, C, and so on) and type (integer, real, char, for example) defined before it is used.

This variable declaration is done in a special section of the program between the *program* statement and the *begin . . . end* of the main body. To signal the start of variable declarations, we insert the keyword *var*, then name our variables and give their types. To wit:

```
PROGRAM simple(input,output);
VAR
  a       : integer;
  b       : integer;
  c       : integer;
BEGIN
  REM  SIMPLE BASIC PROGRAM
  readln(a);
  readln(b);
  c := a + b;
  writeln(c);
  REM  END OF SIMPLE BASIC PROGRAM
END.
```

Actually, since a, b, and c are all of the same data type (integer), we could define them all in one statement:

```
VAR
  a,b,c   : integer;
```

There are four basic data types in Pascal: integer, real, char, and Boolean. The first three are fairly obvious: integer numbers (0, 5, −18232), real or floating-point numbers (0.0, 3.14159, −35.323e−5), and ASCII characters ("A", "&"). Boolean variables have either of two values—*true* or *false*—and are used to store the truth status of some proposition so that it can be tested later.

Only one thing remains to make our simple Basic program into a simple Pascal program: change the comment statements. In Basic, each comment line starts with *rem* (for *remark*). In Pascal, there are two ways to write a comment. You can either enclose it within curly brackets (using the shift position of the two keys to the right of P on the IBM keyboard) or, if you're working at a terminal that lacks those characters, you can use the sequences "(*" and "*)" instead. Since the typeface used by this magazine doesn't offer curly brackets, we'll use the parenthesis-asterisk combination in our programs; you'll probably find it easier to substitute curly brackets.

We'll add a few comments now to ensure that our program is well documented. Here's the final version:

```
PROGRAM simple (input, output); (* ignore "(input,output)"*)
(* a simple Pascal program converted from Basic.
  DATE:       23 December 1982
  AUTHOR:     Charles Q. Fordyce                  *)
VAR
  a,b      : integer;            (* input variables   *)
  c        : integer;            (* output variables *)
BEGIN (*main body of PROGRAM simple*)
  readln(a);    readln(b);
  c := a + b;
  writeln(c);
END. (* of PROGRAM simple *)
```

There you have it, an honest-to-goodness Pascal program, guaranteed to run with any compiler that supports ISO Standard Pascal.

Here's a review of the steps we used to translate our Basic program into Pascal:

1. Delete all line numbers.
2. Replace I/O statements.
3. Replace assignment "=" with ":=".

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4. Add semicolons at the end of statements.
5. Drop *stop* at end of program.
6. Add "PROGRAM /name/ BEGIN . . . END.".
7. Declare all variables in the *var* section.
8. Convert *rem* statements.

It would be nice if this set of rules were sufficient for all such translations. Such is far from the case, however. In fact, these rules will only translate a small subset of all Basic programs. Most Basic programs over a certain size cannot be translated at all, but must be converted or rewritten. Our purpose here, however, is not to show you how to convert Basic programs into Pascal; it is to show that you can learn to write simple Pascal programs in just a few minutes.

A Note on Writing Style. You undoubtedly noticed that the last version of our program had two *readln* statements on the same line. Pascal doesn't use lines to distinguish statements—just semicolons. It also doesn't care about line indenting and the use of upper and lower case letters in keyboards and identifiers. You have the freedom to format your programs in a variety of ways. For example, you could have written our program like this:

```
program simple;var a,b,c:integer; begin readln(a) ;readln(b);
c: = a+b;writeln(c);end.
```

The best policy is to pick a format that is consistent, readable, and easy to use; then use it.

A Little Background. The Pascal programming language was developed by Niklaus Wirth around 1970 at the eidgenossische technische Hochschule (ETH) in Zurich.

Back in the seventies, it was hard to pick up a microcomputer magazine without finding an article or heated letter describing why [Basic, Pascal] was such a good language and why [Pascal, Basic] stank. This column will refrain from such comparisons; instead we'll just describe some differences between working in Basic and working in Pascal.

Basic is an interpretive language. This has nothing to do with speech or drama. It simply means that your computer doesn't actually run your program. Instead your computer runs a program called a Basic interpreter, and the interpreter runs your program. The interpreter reads a line of your program and figures out what to do. It does this each time it reads the line, even if it has read it a thousand times before. Basic programs tend to be slow, but it's very easy to make changes to them and you can test a Basic program as soon as you've typed it. If you have an error in your program, you can just retype the line with the error and immediately run the program again.

Pascal is a compiled language. This means that after you have written your program, using some sort of editor, you must run a program known as a compiler. The compiler reads your program and translates it into instructions that your computer can execute directly. (This is not exactly true of UCSD Pascal; see "IBM Pascal versus the p-System" in the September 1982 issue.) Pascal programs are much faster running than Basic programs, but if you've made an error, you have to go all the way through the compilation process again.

Closing Thoughts. There is a story, often repeated, of a woman who wrote a children's book about penguins. Among the letters she received from readers was one from an eight-year-old, who wrote, "Dear Lady: Your book tells me more about penguins than I want to know." Our goal here and in the columns to come is to tell you less, not more, about Pascal than you want to know. But not so little that you grow bored or frustrated. We want to tell you just enough that you feel comfortable with what you're getting and interested in learning more. Please let us know how we're doing. ▲

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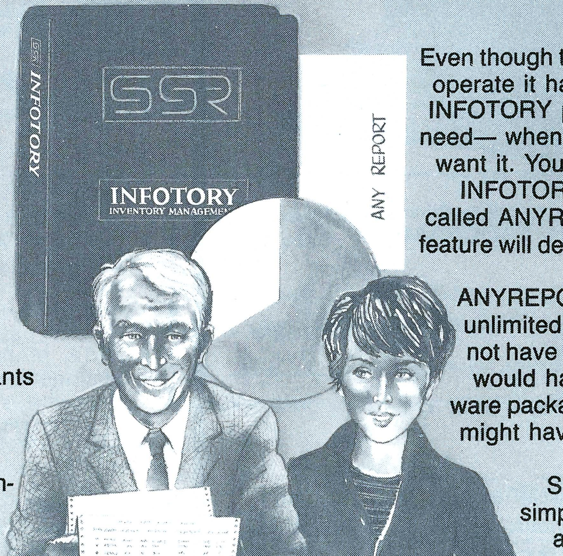

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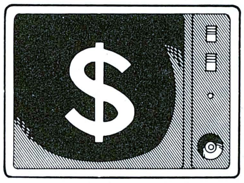

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By Andrew Bartorillo

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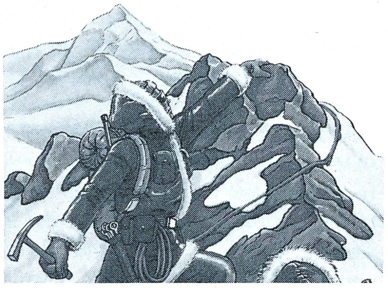

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By William Godwin & Don Knowlton

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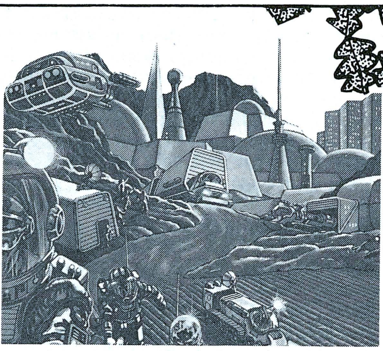

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By David Feitelberg

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Δ **IBM** has filed suit against the chief designer of the Personal Computer, and two other former employees, for "misappropriation of IBM trade secrets." In papers filed September 13, the company names Lewis C. Eggebrecht, senior engineer for the Personal Computer and Datamaster projects and an IBM employee since 1968. The other defendants are William W. Erdman, a manager of IBM's World Trade Americas/Far East Corporation, and Peter J. Stearns, who had been a product development engineer.

According to IBM's complaint, the three employees formed a company called Bridge Technology last summer "to design, manufacture, market, and sell digital electronic-based products" and "provide consulting services." Erdman then approached **Tecmar** (Cleveland, OH) with plans to market about forty products relating to the Personal Computer. Instead of taking up Erdman's offer, Tecmar contacted IBM and described the situation. At IBM's urging, Tecmar agreed to enter negotiations with Erdman and record them "using IBM-supplied tape recording equipment." In the secretly recorded interviews, Erdman showed Tecmar president Martin Alpert a document describing "IBM's Personal Computer product and business plans for the period through 1985." He also said he had contact with "fourteen key people" at IBM who would come over to him "as needed."

In its suit, IBM asks for damages, the restitution of wages paid while the employees "engaged in improper conduct," and injunctions to prevent the defendants from disclosing trade secrets or engaging in unfair competition.

Δ **Context Management Systems** (Torrance, CA) has sold a million dollars' worth of stock to **Brentwood Associates** (Los Angeles, CA). Other Brentwood investments include Apple Computer and Fortune Computer. The money will be used to expand marketing and research.

Δ **Richard Andreini** has been named president of **Datamac Computer Systems** (Sunnyvale, CA). Andreini was formerly vice president for marketing of Intersil. **Dr. Robert McCullough,** the previous president, will continue as executive vice president of engineering and chairman of the board. Meanwhile, **Richard Canfield,** former vice president/general manager for Commodore International, has been named Datamac's vice president of manufacturing.

Δ **Micro Focus** (Palo Alto, CA) has moved to more spacious quarters. The 4,009-square-foot building is located closer to Stanford University and the San Francisco International Airport. The new address: 1860 Embarcadero Road, Suite 235, Palo Alto, CA 94303.

Δ **Sears, Roebuck and Co.** has signed an agreement with **Eagle Software** (Wayne, PA) to distribute the package *Money Decisions* in its Business Systems Centers. Sears currently has twelve centers and is planning to expand to forty-five by the end of next year. Meanwhile, at Eagle, **Paul Fleming** has been named director of marketing communications. Fleming comes to Eagle from Commodore Business Machines, where he was public relations coordinator.

Δ **Patrick J. Lusey** has been appointed vice president for sales of **Micro Business Software Inc.** (Chester, NH). MBSI markets a line of business software.

Δ **Software Arts** (Wellesley, MA) has hired four new officers. **Donna Conlin** is the new personnel manager. She was previously a senior personnel representative for the Computer Corporation of America. **Paulyn G. Heinmiller** is the company's first full-time librarian. Formerly, she was corporate librarian for Wang Laboratories. **Dale Troppito,** the new manager of *TK!* development, was previously employed by Digital Equipment as a product development manager. **Dawna L. Paton,** formerly of Environmental Research and Technology, and **Beth C. Luchner,** formerly of the MIT Computer Graphics Lab, will be assistant product managers for *TK!Solver* and *VisiCalc*, respectively.

Δ **CP/M '83** is a trade show devoted to CP/M and is sponsored by **Digital Research.** It is scheduled for January 21-23 in San Francisco, California. Contact: Northeast Expositions, 824 Boylston Street, Chestnut Hill, MA 02167; (800) 343-2222.

Δ **Eagle Software Publishing** (Wayne, PA) has moved to more commodious quarters. The company cites personnel growth and increased product development as reasons for the move. The new address is Suite 409, 993 Old Eagle School Road, Wayne, PA 19087.

Δ To accommodate rapid growth experienced during the past year, **SofTech Microsystems**, marketer of the UCSD p-System, has relocated to a 33,000-square-foot facility in the community of Rancho Bernardo, California, in the northern part of San Diego. The new quarters are located at 16885 West Bernardo Drive, San Diego, CA 92127. The new phone number is (619) 451-1230. ▲

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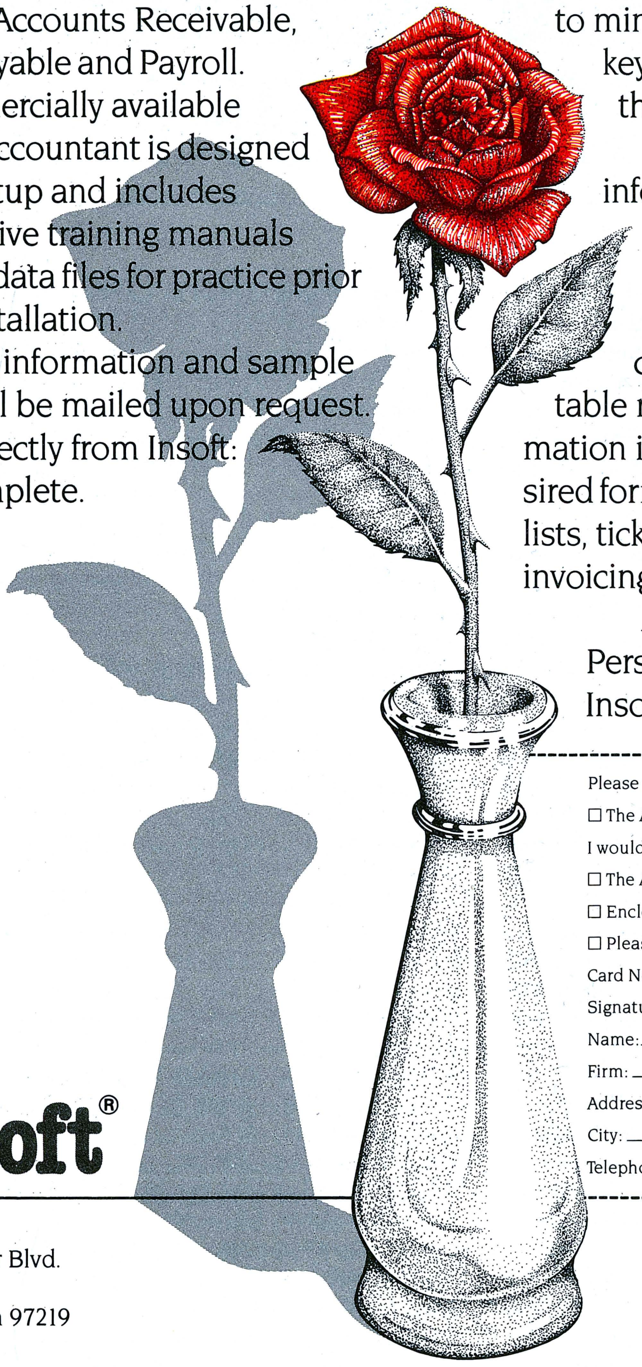

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EXEC MICROSOFT: Young,

by Allan Tommervik

"Microsoft Corporation is the oldest independent supplier of microcomputer software." That's the first sentence of a fact sheet included in a package journalists get when they request information about Microsoft. It's factual enough, but it sure gives new meaning to the word old.

The pyramids are old. The Appian Way is old. Westminster Abbey is old. The Liberty Bell is old. The Erie Railroad is old. Morgan Guaranty Trust is old.

But Microsoft?

Elderly Man River. If Microsoft is old, what does that make IBM? After all, IBM was making computers before the Japanese were making stereo components, calculators, and cars. IBM was in computers when it still took the better part of two days to cross the United States by air. IBM was making computers when the moon was still made of green cheese and had the face of a man carved in it instead of the footprints of man embedded on it. IBM was making computers when gasoline was still less than twenty cents a gallon and the term gas wars applied to your local service station instead of what might happen in the next international imbroglio. IBM was making computers when inflation was what was happening to other countries. IBM was even making computers before Monday Night Football.

Contrast that to Microsoft. When Microsoft started, Watergate was already history. When Microsoft started, the Beatles had already split up. When Microsoft started, the idea of hippies had already been relegated to the realm of nostalgia. When Microsoft started, the theologians had already killed God off and then decided to resurrect him.

To call Microsoft old goes well beyond the normal bounds of hyperbole. Barely a year ago, there wasn't a soul in the company over thirty. In fact, there might not have been a soul in the company who acknowledged that there were people over thirty. Barely a year ago, some of Microsoft's senior language specialists looked like they needed parental permission to stay out after ten o'clock on Friday night. Microsoft would have been a good place for Atra to film before and after shaving commercials if only there had been someone to play the role of before.

But, indeed, there are signs of age creeping into the Microsoft organization. This summer Lobo reached inside Microsoft to pluck out Greg Tibbetts to head its software development program. Even as this story was being written, Lotus Development importuned consumer products president Vern Raburn to join them.

In the microcomputer industry, as elsewhere, there's no more sincere form of flattery than recruiting a company's top executives. Objectively, however, nobody goes after the top execs from the new and unproven firms. Companies chase down executives who have, as the idiom goes, a track record. This means, in most cases, they've had to face and solve the problems the recruiting company is now facing and can therefore eliminate the learning curve. To the extent that Microsoft now has a wealth of these problem solvers, it's probably true that Microsoft has an element of maturity lacking in most competitive firms.

He Must Know Somethin'. Yea, even as Lotus, Lobo, and others nip at the heels of Microsoft to strengthen their own management suites, Microsoft has perpetuated a myth of venerability by raiding Tektronix to fill the job of chief operating officer. Shockingly, the individual chosen was not only over thirty, once considered the mandatory retirement age at Microsoft, he's on the brink of turning forty. Some key employees can legitimately call their new CEO "Pops."

How does it come to be that a company can be old in an industry less than ten years in existence? You take a sprinkling of genius and massive doses of seized opportunity, mix liberally with fortuitous happenstances, and then allow it to rise. Instead of making Wonder bread, you use wonder boys. The result is an old company in a young business. The result is also a company that IBM turned to when it needed software help for its Personal Computer.

Actually, crediting Bill Gates and Paul Allen with a sprinkling of genius is probably an understatement of a magnitude analogous to calling Kareem Abdul-Jabbar tall. Or the Pacific Ocean wide. Or the weather in Seattle partially cloudy.

By the time the two motive forces in Microsoft had reached their majority, they had badgered the minicomputer industry, helped bail a Fortune 500 company out of a potential forfeit position on a government contract, started their own company, and implemented the first Basic to run on a microcomputer.

In the following eight years, they established their Basic as the bellwether of the microcomputer industry, successfully nurtured a

Old, and Way Ahead

Microsoft's ancient execs: Jim Towne, who's having fun as the new president; Bill Gates, who kicked himself upstairs so he could pay attention to future products; cofounder Paul Allen, who nurtures the Multi product line; and Steve Ballmer, who recruits the new help and oversees the IBM connection.

consumer products division, and built an operating system and attendant programmer tools for the IBM pc. Is Bo Derek a 10? Is Ronald Reagan conservative? Are Gates and Allen geniuses?

Gates, by two years the junior partner, and Allen were high school chums at Lakeside High School in the Seattle area. They shared a rabid interest in electronics and computers that found sustenance at Computer Center Corporation, a local firm.

Getting a Charge out of Crashes. The company was in possession of a Digital Equipment Corporation PDP-10 and was offering free time on the computer to anyone—with one stipulation. The time was to be used attempting to crash the system and, if a system crash was induced, documenting the circumstances. When, since Lucille Ball, was such organized mayhem socially acceptable? Gates and Allen took to the PDP-10 like Ben Franklin took to flying kites.

The pair treated the computer like a cat treats a mouse. They toyed with it, learning the hardware and software inside and out while filling Computer Center's logbook with documented crashes of the system. Tons of fun it was, but the world has yet to witness its first opening for seasoned system-crashers.

The experience stood them in good stead, however, because giant TRW was in dire need of PDP-10 experts. The Cleveland-based government contractor was working on a real-time control system for all power generated by the dam network in the Columbia River basin, including the huge Bonneville Dam. The PDP-10 was the instrument of control.

TRW was suffering from a prolonged software development effort that was plagued by bugs. In fact, the company was nearly to the point of having to yield up forfeiture fees for nondelivery of the system. A worldwide call for PDP-10 experts was sounded, and TRW started scouring every nook and cranny for talented help.

One of their resources was the logbook at Computer Center Corporation, which was chock-full of two names—Gates and Allen. The timing was fortunate. Gates was between his sophomore and junior years in high school and Allen had just graduated. So they signed on for a summer of system repair instead of system crashing—Allen working on failure recovery and Gates plying his talents on data storage.

The Hardy Boys. Indeed, forfeiture was averted with the teenagers playing no little part in avoiding the disaster. But the experience also laid seeds for future endeavors in that the government requirements were so stringent. The contract called for 99.999 percent reliability—a goal well outside the realm of usual computer technology. Gates now grins as he recalls a meeting where the final test was planned:

''To meet the government's requirements, we would be allowed ten seconds of downtime. One of the questions was how to allocate that downtime. The hardware people were talking in terms of minutes if there was a failure; the software people were talking in terms of hours.'' The test came off without a hitch.

Allen went off to Washington State that fall and Gates returned to high school, but the real-world experience whetted their appetites for more and they began a company called Traf-O-Data. The pair had devised a more efficient method of reading and reporting data generated by those ubiquitous gun-metal gray boxes that sit by the side of the road and extend rubber arms, octopuslike, into the traffic lanes.

The boxes generated paper tape that Traf-O-Data used as input. Several municipalities in the Washington area took on the company's services, but competition, in the form of other government bodies, proved to be too stiff. The state government found itself with systems having excess capacity for reading the tapes and began offering their reading systems to surrounding communities free. *Sic transit gloria*, Traf-O-Data.

By this time, Gates was off to Harvard and Allen, still at WSU, oversaw the demise of Traf-O-Data. Gates was offered summer employment after his freshman year with Honeywell, which was also looking for full-time help. Gates recommended Allen, who crossed the continent to rejoin his partner.

The Chip That Shook the World. Shortly after Gates returned to Harvard the revolution came. The availability of the 8008 microprocessor prompted Allen to propose that the pair develop a Basic language. Gates nixed the idea. Then *Popular Electronics* ran a story about the first microcomputer, which was being developed by

MITS in Albuquerque, New Mexico. The Altair was 8080-driven, and Gates and Allen agreed that here was a chip worthy of their expending language development time.

They called Ed Roberts, developer of the Altair, and offered their services. Roberts was none too encouraging. There were no prototype systems on which they could work. Several groups were well ahead of them in development of a micro-based Basic. On the other hand, Roberts allowed as how it was first come, first served as to whose Basic he would use. And he figured he was at least a month away from getting any language submitted.

Spurred by even that slight chance, the duo went into immediate action. Allen spent two weeks on a PDP-10, developing an Altair simulator and an assembler. Gates spent that time generating design notes on the language. Working on the larger system, it then took them four more weeks to complete their Basic.

They notified Roberts of their success, and he invited them to submit the language. Allen jumped on an airplane to Albuquerque, only to realize in mid-air that they had failed to provide a bootstrap loader to insert the language in the machine. He spent the travel time devising one.

Private offices allow programmers like Bob Zawalich to kick back during lunch.

Their past experience, working with those impossible reliability requirements on the TRW project, now paid off. Although neither Allen nor Gates had ever seen an Altair, the program ran perfectly on first loading.

Allen returned to his job at Honeywell, but he began badgering Roberts with so many ideas on improvements to their Basic that Roberts finally invited Allen to assume responsibility for Altair's software development.

Clause and Effect. The agreement included a clause stating that MITS would use its best efforts to promote the language development programs Gates and Allen were submitting. That clause remained operative until MITS was purchased by Pertec.

Pertec recognized that the activities of Gates and Allen resulted in products that benefited their mini and micro rivals as well as themselves. At that point, their best effort began to look suspiciously like no effort at all.

Gates and Allen succeeded in extracting the then current version of their Basic from Pertec and formed Microsoft. Finding no further compelling need to locate in Albuquerque, they returned to the Pacific Northwest.

Their continuing language development efforts established Microsoft Basic as the standard for the microcomputer industry. Almost every micro manufacturer provides Microsoft Basic or a kissin' cousin. The result has been that Microsoft Basic is the most used software in the world, running on considerably more than one million machines.

Microsoft's early years were spent essentially farming the original equipment manufacturer market. In 1976 they licensed Basic to such companies as General Electric and National Cash Register. By 1978, they added the two main contenders in the early microcomputer market—Tandy and Apple. During this period, they had also developed Fortran-80, Cobol-80, and Basic-86.

Dynamic Duo. Allen and Gates developed a synergistic working relationship during that time. Allen remained deeply involved in the development of new software tools while Gates remained involved in farming the OEM marketplace and in running the general day-to-day activities of the company.

In summer 1979, Microsoft announced the establishment of a consumer products division and selected Vern Raburn as president. While the OEM division was licensing Unix from Bell Labs and starting work on their micro version, Xenix, Raburn was presiding over the introduction into the marketplace of such bestselling software as *Microsoft Adventure* and *Typing Tutor.*

The biggest hit of the consumer products division, however, was a hardware solution to a software problem.

Allen was becoming more and more frustrated with what might be called the tyranny of hardware. His group had provided significant tools for the Z-80 end of the microcomputer market, and a substantial body of applications software had been developed by independent software vendors using those tools.

On the periphery of this activity was the Apple market, growing daily and inaccessible to Allen's tools or the programs they produced. Just as Allen was the goad that first proposed implementing Basic on a microprocessor, he now began proposing a revolutionary new hardware product, one that would permit 8080 software to run within Apple's 6502 environment.

Allen correctly perceived that it would be far less expensive and far more efficient to find a hardware solution than it would be to translate all 8080 software into 6502 code. The resulting product—the Microsoft SoftCard—stands as revolutionary in two respects:

First, it was the first significant step in freeing software developers from the tyranny of hardware designers. Current imitations such as the Baby Blue card bringing CP/M to the pc and Alpha Software's Apple-IBM Connection sing paeans of praise to Allen's insight.

Second, the SoftCard's popularity in the Apple market became so great that Apple is now the microcomputer with the largest base of CP/M users, even though the native 6502 environment is hostile to the CP/M operating system.

Cheesy Broadcast. Allen's SoftCard success sent a clear message to hardware manufacturers: the world will no longer beat a path to the door of the maker of a better mousetrap, but they'll sure pound on the door of the fellow with a better brand of cheese.

That message was heard loud and clear in Boca Raton, Florida. There IBM was plotting its entry into the microcomputer marketplace. One thing that Big Blue is renowned for is recognition of human resources. Kitty-corner across the continent in the Pacific Northwest there was clearly a reservoir of talent to be tapped. Not only was Microsoft Basic the standard for micros, Microsoft as a company had doubled in sales in each year of its existence. Big Blue likes that sort of track record.

So it came to pass that the mountain went to Mohammed.

Microsoft is accustomed to working in the future in the sense that its language development is mostly done before a machine hits the market. But never had the company been called upon to deliver into the future such a broad spectrum of products.

IBM didn't want just Basic. They wanted Basic, Cobol, Fortran, and Pascal. They wanted programmer tools like the *Macro Assembler.* They wanted useful programs like *Typing Tutor* and more frivolous software like *Adventure.*

But first and foremost, IBM wanted an operating system.

Could there be any doubt that Microsoft could respond? It's probably easier to grow bananas on the tundra than to define a software task Microsoft can't do.

Three Ring Circus. The operating system closed the loop, making Microsoft the first total-package software house. Microsoft now defines the operating environment, makes software tools and languages for software vendors writing in that environment, and mar-

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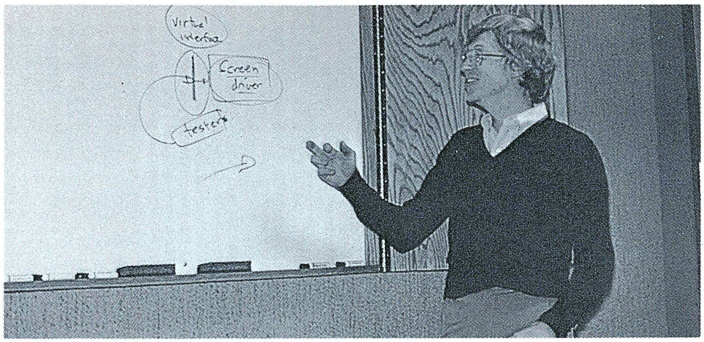
kets various products for the end user. No other software developer houses all three activities—operating systems, software development tools, and end user products.

Needless to say, closing that circle brought concomitant growth and additional stress to the organization. Bearing the brunt of much of that stress has been Microsoft veteran Steve Ballmer.

Ballmer had an applied mathematics degree from Harvard and was attending Stanford's business school when Gates beckoned him to be special assistant to the president. Subsequently, Ballmer has acted as a roving executive, serving where the need was the greatest.

For a time, that was as general manager of the consumer products division. Now Ballmer is vice president for corporate staffs. As such he's managed the logistics of Microsoft's move into a new facility of their own during the last twelve months, conducted the recruiting efforts that have maintained Microsoft's high caliber of employees, and served as the account executive for IBM.

Clearly, Ballmer's activities representing Microsoft to IBM are of no trivial consequence to the company. But the action he's taken that will have the most direct influence on the future of Microsoft was when he set in motion the search for a new president.



Gates explains the development philosophy behind the Multi product line.

It is not easy to find a competent lunatic. And lunatic you'd have to be to covet the presidency of Microsoft. It's as close to a no-win situation as any since Custer decided he had Sitting Bull outgunned.

Under the guidance of Gates, who makes no pretense of wanting to be a strong chief executive, Microsoft had doubled in sales every year. That meant that last year was worth about sixteen million dollars. It's not easy to follow a genius. Clearly, Ballmer had no easy chore in finding somebody qualified for the challenge who wouldn't quail at the risk.

The Greatest Show on Earth. By this time it should be clear that Microsoft doesn't do things in a small way. When they set out to make a piece of hardware, it turned Apple into the biggest base of CP/M users. When they set out to do an operating system, they didn't do it for Allied Nobody, nor even for Tandy, but for IBM.

So it seems natural in retrospect that they sought out Jim Towne, who only ran a division of Tektronix some three to five hundred times as big as Microsoft. What the actual ratio was will never be known, because Tektronix is so taciturn about its finances that it makes Hughes Aircraft appear garrulous in comparison. But Tektronix is a billion-dollar company and Towne was vice president and general manager of the instruments division, the largest in the company.

Not even Towne can be explicit about all the elements that made the Microsoft opportunity attractive, but he's clearly not a man taken leave of his senses. The now-departed Raburn says, "Towne was born for Microsoft."

Towne was the kind of youthful achiever other kids hated to be compared to. A Boy Scout, outstanding student, track athlete. Same story at Stanford, where he collected a couple of degrees.

Towne went back home from Stanford to join Tektronix. Maybe he had it too easy there. In twelve years he went from nobody to vice president and general manager of Tektronix's largest division. Not that it was all that easy. When he made a set of relatively innovative suggestions to top management, they didn't stifle him; they said, "Okay, Towne, put up or shut up," and put him in charge. It's not easy to put your money where your mouth is, especially not when some of your peers are just waiting for you to come up a day late or a dollar short. Jim Towne never did.

But Towne does call Microsoft "exciting," perhaps an element missing at Tektronix, although he's never indicated as much, even by inference.

Towne has a clear vision of his role at Microsoft—a vision that sometimes takes the form of deja vu. "This is the critical time for this company. It's my job to shepherd it through the stage from twenty to sixty million dollars in sales. That's the stressful time."

Then he muses that "Maybe I've been trained for stress. I'm not a software guy, but I enjoy this company . . . helping solve their industrial problems. All the structures get different in bigger companies, but we have to recognize that to bright people, big is not beautiful."

Bright people are indeed who Towne is working with. Ballmer seeks out only those folks who appear to be in the upper 5 to 10 percent in energy and intelligence to work at Microsoft.

Keep Your Bright Ideas to Yourself. But even bright people can stumble when trying to think through a problem that's new to them. At Tektronix, Towne confronted and reasoned through many of the problems now facing Microsoft, such as the advisability of opening foreign markets and which key to use if such a market is to be unlocked.

Towne's advent has created changes, the most obvious of which is that Gates is now free to pursue technical matters. Gates is now chairman of the board and executive vice president, focusing particularly on product design. Allen remains an executive vice president, managing the Multi line of products and operating systems.

Gates is the man at Microsoft with the clearest vision of the future. The company is putting the finishing touches on the next version of MS-DOS, which will be a free update to owners of prior versions. Features include interrupt ability, background printing, and background communications.

Microsoft is preparing a multitasking—concurrent processing—version of DOS, but Gates is clearly not convinced that this is the wave of the future. He leans more to the line of thought that holds that networking—multiple users sharing expensive peripherals—is more valuable. Xenix is the Microsoft answer.

The company is making a big splash with *MultiPlan*, the electronic spreadsheet that is the first of "perhaps a dozen" Multi packages to be released in the next year. *MultiPlan* was finished nearly two years ago, but extensive beta testing and perfecting of the software tools to make the product instantaneously available across a wide range of machines held up release. In spite of plans for several other products to follow, Gates avers that Microsoft is not going after what he refers to as the applications software market.

He explains that the key to developing applications software is "understanding the problem domain," while the products Microsoft is developing are generic. Gates sees continued use by software publishers of Microsoft tools and operating systems and points to Microsoft's involvement in generic products as a way to find holes in the operating system and plug them. "If the operating system isn't strong enough, it limits the independent software vendor. Having visibility of all the elements is the key to strengthening the operating system."

Not the Final Word. Gates does not rule out more hardware answers to software problems, such as the SoftCard. He also believes there'll be more hardware-software combination answers to problems in such areas as communications.

Gates sees enhanced graphics as the most notable improvement in the next generation of software. "The hardware isn't going to get

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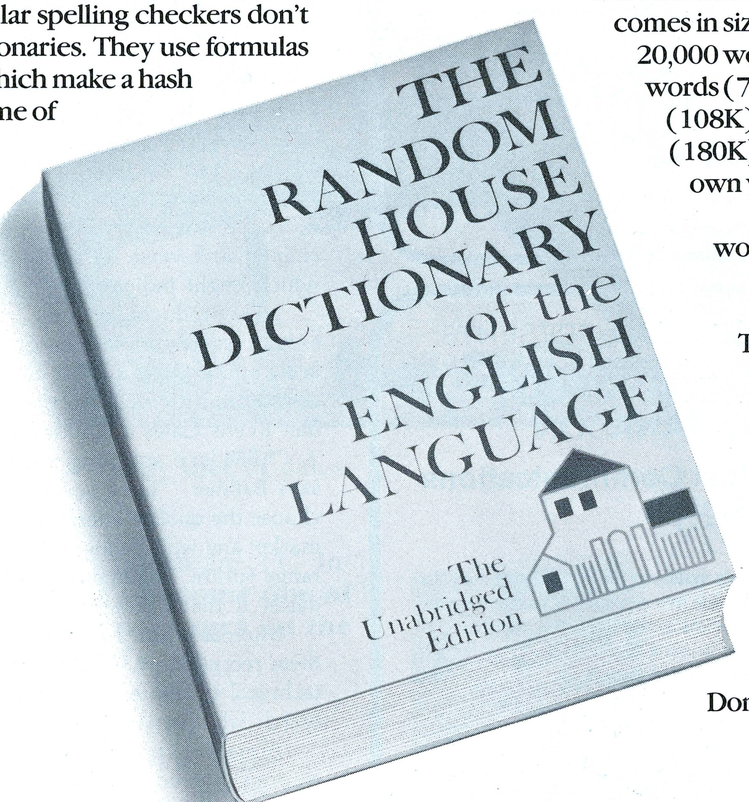

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While Gates has been shucking executive responsibilities to get more involved on the technical side, Allen has found more and more of his time spent in management and less in hands-on technical work.

Allen takes his change philosophically, pointing out that it's a matter of leveraging the time. By contributing to design and supervising implementation, more of his abilities are applied for Microsoft's benefit than if he specialized.

But as befits the mind that conjured up an Altair simulator without an Altair in hand and a SoftCard to expand the software horizons, Allen still gets more excited about new ideas, new concepts, and new challenges.

He points out that Microsoft's expanded product line puts them into some of the most competitive marketplaces in the world, a challenge he clearly relishes. Developing and using the tools that enable the company to bring out a usable, powerful product in different environments simultaneously is a cherished goal.

Allen believes machines similar in concept to the Xerox Star but costing a fraction of the $70,000 asking price will be available within a few years, and he thinks Microsoft's expanded product line will be ready to take advantage of that machine when it arrives.

Sea Wolves. His group continues to develop software in C on larger systems for downloading to the host systems after completion. Pascal was used for development of the languages for the IBM Personal Computer, but other development reflects Allen's preference for C.

For all of the progress Allen sees in the microcomputer industry, there's one nettle in the rosebush. "I've been disappointed that no viable, low-cost networking technology is available." He can cite chapter and verse on the difficulties of executing such a system, which might indicate that he's working on a solution.

New products and new ideas abound at Microsoft, but all the executives remain cautious of quality standards. Ballmer and Towne both praise Gates for his unwillingness to let any product be released until it's as perfect as they can make it. In that regard Ballmer likens Gates's thinking to that prevalent within IBM.

"IBM is, if anything, more exacting on themselves than on us," says Ballmer. "They never make a dumb decision and they always choose the quality alternative. They've got a long-term view of the market and won't allow a poor product that would affect their long-range future." Ballmer says Gates is even tougher on quality standards, if that's possible.

Microsoft now has more than two hundred employees, most of them recruited by Ballmer, who says, "We still have a high ratio of technical to nontechnical people here. This is run more like a research lab."

Almost everyone at Microsoft has a private office, and leadership on a given project stems not from seniority or title but from knowledge of the requirements.

The Success Express. Towne is convinced the company is on the right track. "More than 50 percent of our effort is going into new products." With that in mind, Towne is tackling building a more powerful and decisive marketing entity that can support those new products. "We'll be working hard to differentiate our products in the marketplace."

To that end, Towne gets out of his chair and into computer stores where he can witness firsthand what the end user feels about his new company.

What Towne feels about Microsoft is apparent as he sums up his legacy from the founders: "There's almost an innate wisdom about this place. 'Hire good people.' 'Don't grow too fast.' 'Don't introduce product too soon.' This job is fun and there's no politics." ▲

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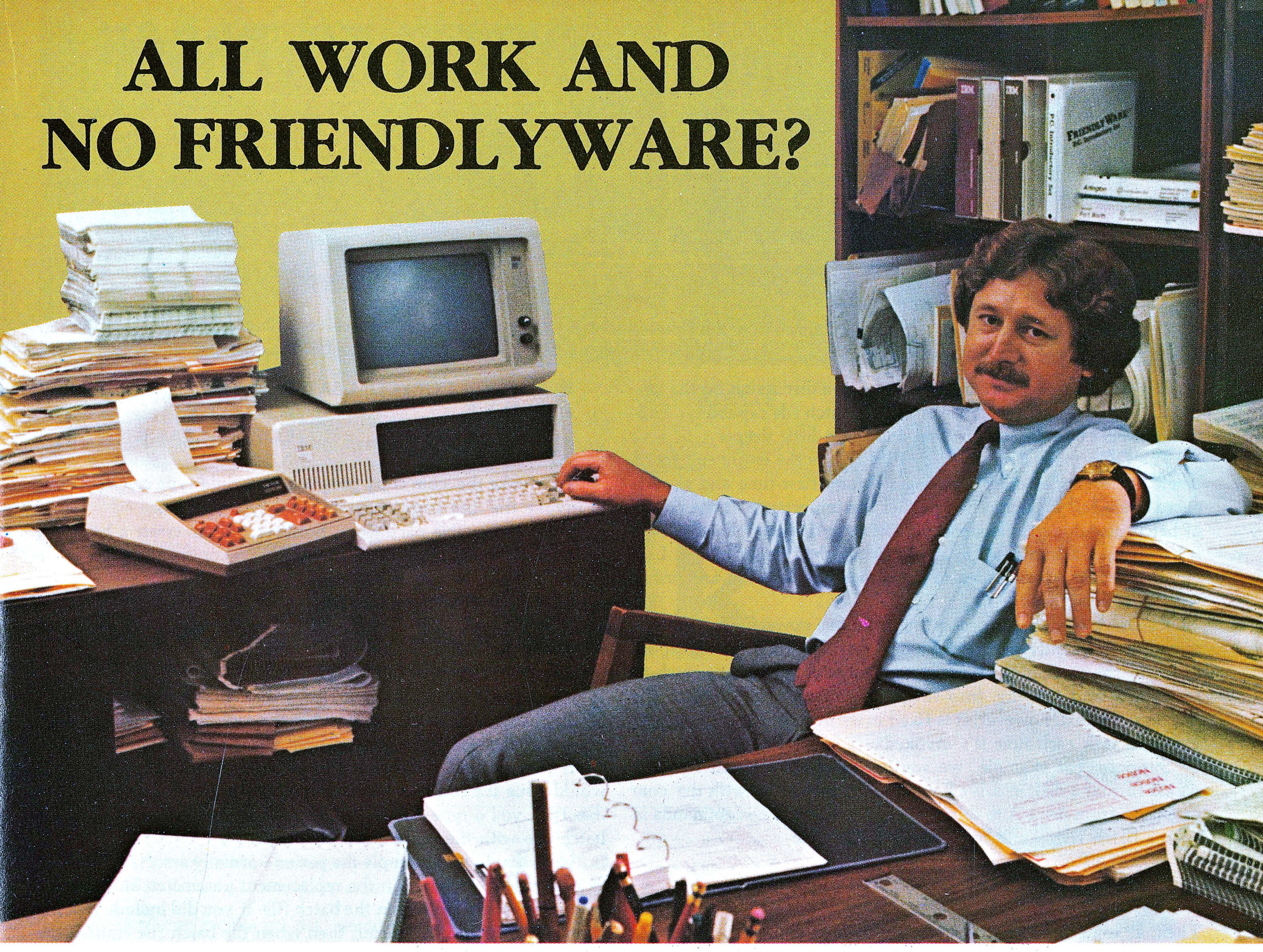
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SYSTEM NOTEBOOK

by Alan Boyd

Last month we left off in the middle of a discussion on the use and, in one example, the abuse of DOS's batch file capability. This month we'll continue in this vein and dig a little deeper.

The DOS manual supplied by IBM covers the entire subject of batch processing in only four pages. Many first-time and experienced users fail to comprehend either the importance or the power of batch processing. Many simply don't use this capability because it hasn't been documented to any extent in the IBM literature. Last month's article was intended to encourage you to get in and tinker with something new.

As we've seen, batch processing is quite a powerful tool for automating frequently performed tasks, such as the backing up of disks, or for combining common sequences of commands, such as formatting and copying, into single operations. Once a batch file has been created, however, it is fixed in its purpose; it will perform the same task each time it's invoked.

Suppose, for example, we wanted to create a batch file that would format a disk in drive B and then copy all files with the .com extension from drive A to the newly created disk. The commands in such a batch file would be something like this:

```
FORMAT B:
COPY A:*.COM B:
^Z
```

Then, at some later date, let's say we wanted to create a batch file that would do substantially the same thing, but instead of copying all the .com files we wanted it to copy all the files with the .bas extension. This file would, of course, look something like this:

```
FORMAT B:
COPY A:*.BAS B:
^Z
```

As you can see, the two batch files are the same, except that the extension .com in the former has been replaced by the extension .bas in the latter. If created in the way we just described, they would take up the space of two files on a disk, which seems like quite a waste, considering how computers are usually such good tools for combating redundancy. It would certainly be nice to have just one batch file on the disk that was capable of performing both tasks. Predictably, DOS has such a feature.

Replaceable Parameters. DOS has the facility to remember up to ten parameters that the user can enter when invoking a batch file. These parameters are then used to replace a corresponding number of dummy parameters that have been specified within the batch file. The dummy parameters are represented within a batch file by the percent character followed by one of the digits from 0 to 9. This parameter facility is somewhat analogous to the wild card facility that we discussed earlier in this series, but it is more specific and it can only be used in conjunction with batch processing.

Lost? Well, don't worry; this happens to be one of those concepts that are easier to use than to describe. Let's look back at the pair of batch files we created a moment ago. Let's assume we have both of these files on the same disk, stored under the names Copycom.bat and Copybas.bat.

```
REM This is COPYCOM.BAT REM This is COPYBAS.BAT
FORMAT B:               FORMAT B:
COPY A:*.COM B:         COPY A:*.BAS B:
^Z                      ^Z
```

To invoke the .com copy program we would type *copycom*, and to invoke the .bas copy program we'd type *copybas.*

Using replaceable parameters, however, we can create a batch file that performs either of these functions on command. Such a file would contain the following:

```
REM This is COPYALL.BAT
FORMAT B:
COPY A:*.%1 B:
^Z
```

The %1 in this file is a *dummy parameter*. When you invoked this file, you would have to specify what the replacement for the dummy parameter would be. Here's how you would do that.

If you wanted this batch file to copy all the .com files, you would issue the command *copyall com.* If you wanted it to copy the .bas files, you'd type *copyall bas.* You simply follow the name of the batch file with the *replacement parameter*.

Note that in this example the period normally associated with an extension isn't included in the replacement parameter, since it's already been specified within the batch file. If you did include it in the command line as a parameter, then when the batch file emitted the command, the command would contain two periods—which wouldn't make sense to DOS. It doesn't matter whether you specify the period within the batch file or within the replacement parameter, but you can only specify it once.

Of course, the batch file we just created would not be limited to copying .com and .bas files; you could copy any kind of file with this batch file, simply by entering the appropriate extension as the replacement parameter. Try some variations and see for yourself.

One additional capability that really puts icing on the cake is the use of the wild card characters within a batch file containing dummy or replaceable parameters. To illustrate, try invoking our example batch file with the command

```
COPYALL *
```

The replacement facility simply substitutes the wild card character * for the dummy parameter %1, causing the batch file to emit the command

```
COPY A:*.* B:
```

which is the command to copy all files on the disk in drive A over to drive B.

You may have noticed that the dummy parameter used in this example is %1, although we said that any parameter from %0 to %9 could have been used. Why then %1 and not %0?

The answer is that %0 has a special meaning for replaceable parameters within batch files. That parameter, %0, is used to designate the name by which the batch file is invoked. In our example, %0 would be equivalent to the batch command *copyall.*

Here again an example will clarify. Modify the .bat file Copyall, if you are using an editor; if you're using the *copy con:* procedure we described last month, just retype the file as

```
TYPE %0
COPY A:*.%1 B:
^Z
```

Then invoke the file by typing *copyall com* and note the results. DOS first replaces the %0 dummy parameter with the first command on the command line—in this case, with the word copyall. It then issues the command

```
TYPE COPYALL
```

Of course the file is stored under the name Copyall.bat, not simply Copyall, so *type copyall* produces a "file not found" message. Therefore, in this one example, we've shown how the special %0 dummy parameter works and at the same time demonstrated one of the more common pitfalls associated with its use. The way to avoid this pitfall would have been to invoke the file by typing

```
COPYALL.BAT COM
```

If we had put these few extra keystrokes into the command, the dummy parameter %0 would have been replaced by Copyall.com. The batch file would have worked correctly, first emitting the

DOS would assign parameters as follows:

%	DOTHIS	**(the name of the batch file invoked would be DOTHIS.BAT)**
%1	*.BAT	
%2	README.TXT	**(a popular name for important documentation files)**
%3	*	**(the wild card character for all)**
%4	FOO.BAR	
%5	??1	**(a wild card expression that could signify all files with an extension ending in 1)**
%6	MAC	**(a common extension used with the IBM Macro Assembler)**
%7	BAK	**(a popular extension for backup files)**
%8	BASICA	**(the command normally used to invoke Advanced Basic)**
%9	SAMPLES	**(the name of the sample Basic programs stored on the DOS master disk)**

These parameters would be inserted in place of the dummy parameters in the batch file Dothis.bat. Suppose that Dothis.bat con-

ands:

file Dothis.bat

ME.TXT * FOO.BAR ??1 MAC BAK

to emit the following:

file	**(this line unchanged)**
	(display all directory entries with the extension .bat)

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FORMAT B:                  FORMAT B:
COPY A:*.COM B:            COPY A:*.BAS B:
^Z                         ^Z
```

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One additional capability that really puts icing on the cake is the use of the wild card characters within a batch file containing dummy or replaceable parameters. To illustrate, try invoking our example batch file with the command

```
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```

The replacement facility simply substitutes the wild card character * for the dummy parameter %1, causing the batch file to emit the command

```
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```

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```
COPYALL.BAT COM
```

If we had put these few extra keystrokes into the command, the dummy parameter %0 would have been replaced by Copyall.com. The batch file would have worked correctly, first emitting the command

```
TYPE COPYALL.BAT
```

which would have displayed the contents of the file, then issuing the command

```
COPY A:*.COM B:
```

to complete the batch process.

Passing Multiple Parameters. Since DOS recognizes the dummy parameters %0 through %9, a total of ten parameters may be passed to a batch process, nine of which are specified by the user when the file is invoked. The thought of building a batch file with ten dummy parameters may seem intimidating, but such a file can be built with a little thought. The function of such a file would be complex—perhaps too complex. The capability nevertheless is there.

When DOS is told to process a batch file command and it finds multiple parameters on the command line separated by spaces, it assigns each parameter in numerical order to a dummy parameter. The first parameter specified on the command line would replace %1 in the file, the second %2, and so on. So if you entered the command

```
DOTHIS *.BAT README.TXT * FOO.BAR ??1 MAC BAK
  BASICA SAMPLES
```

DOS would assign parameters as follows:

% – DOTHIS		(the name of the batch file invoked would be DOTHIS.BAT)
%1 – *.BAT		
%2 – README.TXT		(a popular name for important documentation files)
%3 – *		(the wild card character for all)
%4 – FOO.BAR		
%5 – ??1		(a wild card expression that could signify all files with an extension ending in 1)
%6 – MAC		(a common extension used with the IBM Macro Assembler)
%7 – BAK		(a popular extension for backup files)
%8 – BASICA		(the command normally used to invoke Advanced Basic)
%9 – SAMPLES		(the name of the sample Basic programs stored on the DOS master disk)

These parameters would be inserted in place of the dummy parameters in the batch file Dothis.bat. Suppose that Dothis.bat contained the following commands:

```
REM This is the batch file Dothis.bat
DIR A:%1
TYPE %2
PAUSE
COPY %3.%6, B:%3.%7
ERASE %3.%5
TYPE %4
%8 %9
^Z
```

In this case the command

```
DOTHIS *.BAT README.TXT * FOO.BAR ??1 MAC BAK
  BASICA SAMPLES
```

would cause the batch file to emit the following:

```
REM This is the batch file            (this line unchanged)
  DOTHIS.BAT
DIR A:*.BAT                           (display all directory
                                      entries with the
                                      extension .bat)
```

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TYPE README.TXT	(display on screen the contents of the file Readme.txt)
PAUSE	(this line unchanged)
COPY *.MAC B:*.BAK	(make a backup copy on drive B of all .mac files; change the extensions of backups to .bak)
ERASE *.??1	(erase all files on the disk that have extensions ending in the number 1)
TYPE FOO.BAR	(display on screen the contents of the file Foo.bar)
BASICA SAMPLES	(load Advanced Basic and run the program named Samples)

This program is actually quite useless as a batch file, because it's not likely you could use it over and over again for different tasks, just by changing the replacement parameters. All it really does is demonstrate the concept of multiple replacement parameters. This multiparameter facility is not really of much use to the novice or unsophisticated user. On the other hand, it is of considerable value to programmers who make use of the *Macro Assembler* or any of the language compilers supplied by IBM.

It's not unusual for programmers to have to enter a list of parameters when issuing instructions to an assembler, compiler, or other software development tool. Frequently the same parameter has to be entered several times. In many programming situations, the programmer has to write part of his program, compile it, test it, discover bugs, and go back to editing it—and has to repeat this cycle over and over again. The replaceable parameter facility of the batch system can save lots of keystrokes in situations like this.

Let's look at an example of an advanced use of replaceable parameters. Don't worry if you don't understand the commands in this example; just notice how much work the batch file can handle.

A programmer using the *Macro Assembler* often has to specify three files in order to invoke the assembly process; typically these files will have the same file name with three different extensions. The programmer is likely to find himself entering commands such as

```
MASM B:MYFILE,B:MYFILE,B:MYFILE
```

This looks like a job for replaceable parameters. By first constructing a batch file something like

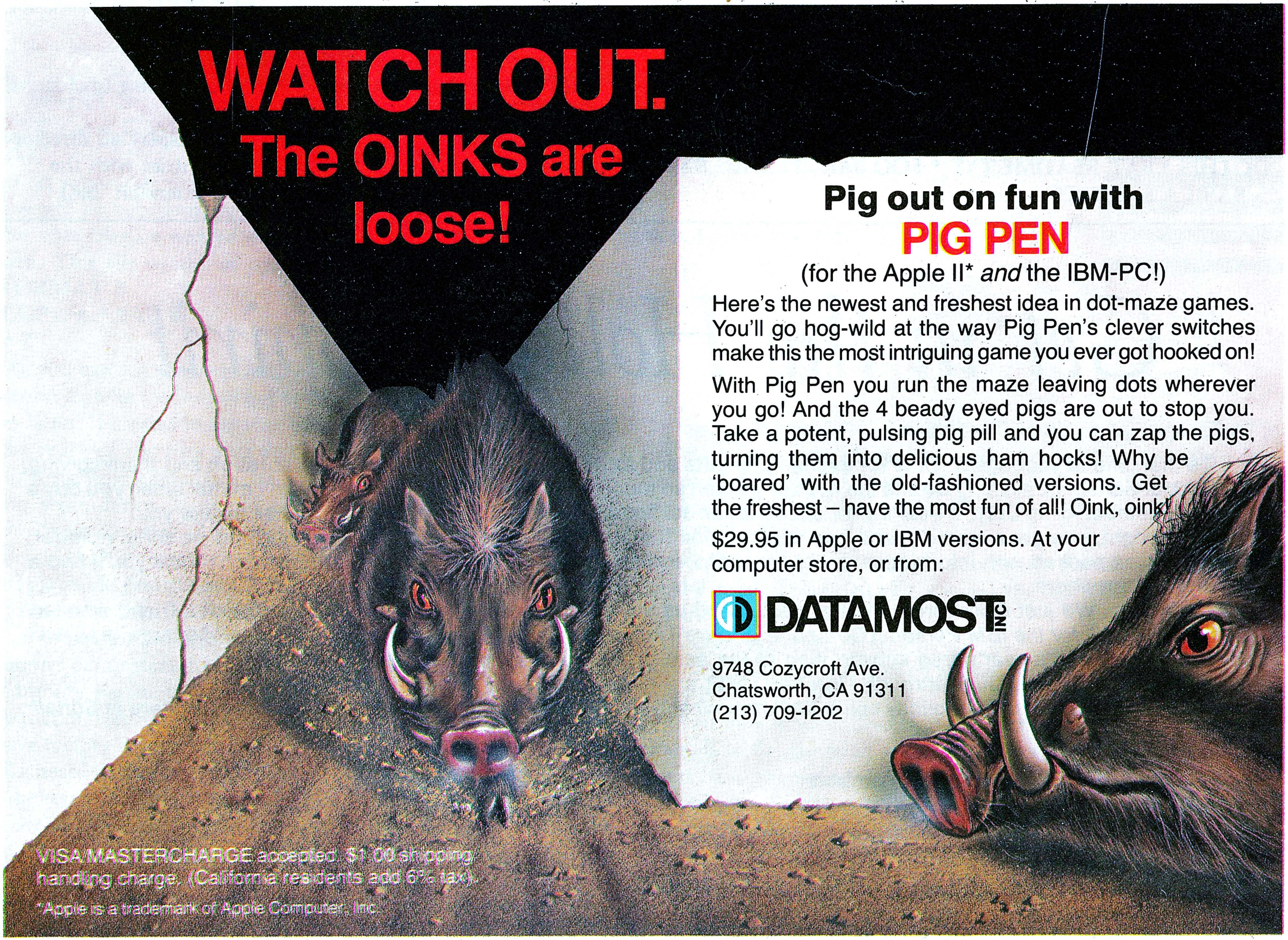
```
REM This is ASMFILE.BAT
REM First make a backup copy
COPY %1.ASM %2.ASM
REM Next assemble the source file
MASM %2,%2,%2
REM Finally read the assembler listing
TYPE %2.LST
^Z
```

and then invoking the file by issuing the command

```
ASMFILE A:MYFILE B:MYFILE
```

the programmer can save many keystrokes every time he wants to reassemble the program. Typing this short command does the equivalent of typing

```
COPY A:MYFILE.ASM B:MYFILE.ASM
MASM B:MYFILE,B:MYFILE,B:MYFILE
TYPE B:MYFILE.LST
```



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The batch procedure not only eliminates keystrokes, it also ensures that the necessary steps are performed each time the program is assembled, thereby reducing the chance of accidental erasure of an important file.

One batch file that should be in everyone's library is a command to copy and verify a named file. This would batch together the *copy* and *comp* commands, along with a replaceable parameter for the filename. The core of such a batch file would look like this:

```
REM This is the batch file COPYVER.BAT
REM %1 is the filename to be copied from drive A to drive B
COPY A:%1 B:
REM Next verify the transfer
COMP A:%1 B:
^Z
```

This batch file command would be invoked by typing the new command *copyver* and passing the name of the file to be copied and verified. For example, if you wanted to transfer the file BasicA.com from drive A to drive B, you'd enter

```
COPYVER BASICA.COM
```

Of course, you could use the wild card characters * and ? in replaceable parameters, just as you might use them in any other kind of command. So by typing

```
COPYVER *.*
```

you could cause this batch file to transfer the entire contents of a disk from drive A to drive B and verify the results.

The Pesky Percentage Sign. Like most other good things in life, the replaceable parameter scheme has a problem that needs airing. Actually, problem may be too strong a word; it's more a mild irritation. It stems from the fact that the percent symbol is used to mark a replaceable parameter and is also a legal character for use within a filename. You can imagine the confusion that might arise if you were passing parameters to a batch file and one of those parameters was a file specification that contained the percent character.

Suppose, for example, that for whatever reason you have a batch file with a replaceable parameter %1 that is to copy a file from drive A to drive B and verify the results. This batch file, let us say, will selectively transfer files named Scores%.txt and Scores%.ndx; the replaceable parameter will be used to indicate the extension. Such a batch file—we'll call it Mytest.bat—will contain the following:

```
REM This is the file MYTEST.BAT
REM %1 is a replaceable extension
REM First copy the file
COPY SCORES%.%1 B:
REM Then compare and verify them
COMP SCORES%.%1 B:
^Z
```

With this batch file, if we wanted to transfer and verify the file Scores%.txt, we would enter the command

```
MYTEST TXT
```

which would instruct DOS to replace any %1 parameters with the extension .txt. On encountering the command *copy scores%.%1 B:*, however, DOS would get confused. It wouldn't be able to tell if the first % was a filename character or part of a replaceable parameter.

In fact, if you create this batch file and try invoking it, you'll see that the batch file tries to use the first percent sign as part of a parameter and emits the command

```
COPY SCORESTXT B:
```

Since no such file exists, DOS issues the message

```
0 File(s) copied
```

and goes on to the *comp* operation—where it runs into the same problem.

To overcome the difficulty caused by percent signs within filenames, DOS has devised a special rule: if a batch file contains a filename with a percent sign in it, the percent sign must be doubled. When the batch file processor sees a filename with two adjacent percent signs, it understands that this combination of characters represents a single percent sign in the filename.

So, to amend the batch file of the previous example, we would type:

```
REM This is the file MYTEST.BAT
REM %1 is a replaceable extension
REM First copy the file
COPY SCORES%%.%1 B:
REM Then compare and verify them
COMP SCORES%%.%1 B:
^Z
```

The conflict is now resolved. When this batch file is invoked, it performs as intended.

This mild quirk of DOS applies not only to batch files that use replaceable parameters, but to all batch files. It's probably best simply to avoid using percent signs in filenames. You can imagine how confusing it might become to try to work with a file with several percent signs. To look at the worst possible case, suppose you were dealing with a file name *%%%%%%%%.%%%*—a perfectly legal file. If you put that filename into a batch file, you'd have to call it *%%%%%%%%%%%%%%%%.%%%%%%*.

If a percent sign appears within a replacement parameter it doesn't need to be doubled. For example, if a dummy parameter within a batch file is to be replaced by an extension such as .pc%, this would not present any ambiguity to the batch file processor.

Let's take another look at a batch file we created earlier:

```
REM This is the file COPYALL.BAT
FORMAT B:
COPY A:*.%1 B:
^Z
```

If we want to use this file to format a blank disk in drive B and copy to it all files with the extension .pc%, we can issue the command

```
COPYALL PC%
```

and the batch file will perform as expected.

That pretty much covers the use of batch files under DOS. It's probably worth stating that these features are somewhat comparable to the *submit* and *xsubmit* features of CP/M-80, although they're substantially more functional and less complex for the user. Future releases of DOS will probably show even more improvement in the functionality of the batch processor.

Before closing this month, we should mention one other small idiosyncrasy in the operating system that isn't dealt with in the IBM literature. As we've said, a file with the extension .com or .bat can be invoked by simply typing the filename; the extension doesn't have to be included on the command line. This is also the case for files with the extension .exe; these are executable machine-language files.

If you should happen to have the following three files on the same disk:

```
MYTEST.COM
MYTEST.BAT
MYTEST.EXE
```

and you issue command

```
MYTEST
```

DOS will execute the file Mytest.com. The priority scheme is such that when a command is issued, DOS first looks at a file with the extension .com whose filename matches the command. If it doesn't find such a file, it looks for a match with the extension .exe. If it still hasn't found a match, it hunts for a file with the extension .bat. It doesn't matter where the name of the file is physically located in the disk directory. In other words, the order of precedence is not determined by the order in which the files are stored on disk.

In general, it's not good practice to have command and batch files by the same name; it just leads to confusion.

Next month we'll look at some more DOS commands we haven't covered yet. ▲

THE PROFIT PLOT

by Shirley Fisher

Take a few minutes to reminisce about the early days of your career. Perhaps you were newly married, with thoughts of starting a family. School days were over and you were just embarking on your journey to set the world on fire.

At about the same time you may have had a friend who was just starting out in the insurance business. In a discussion with your friend one day, you probably awoke to the fact that you needed to provide some sort of financial protection for your family and your growing responsibilities (these probably taking the form of children).

As your friend no doubt explained, the primary purpose of life insurance is to provide financial security for your loved ones in the event you are not around to provide for them. To state it in other words, life insurance insures a certain degree of your economic potential. Its intent is to pick up where you leave off. In a sense, it's an umbrella of protection for your family that helps shield them from the hailstones of financial difficulties if you are no longer there.

Friendly Persuasion. Maybe you bought some sort of life insurance policy to provide as much protection as you could afford at the time. Perhaps it was a whole-life policy or a family policy, possibly with a decreasing-term insurance rider. Your friend helped you get your economic potential partially insured. And at the same time, you helped your friend get started in the insurance business.

A few years later you were farther down the road to financial success. You realized that your economic potential was growing along with your family responsibilities. A natural step at this time was to contact your friend and purchase additional insurance protection.

Human nature has a way of making us complacent. We tend not to think about unpleasant things as long as they aren't creating problems for us. Once we feel we have enough "death insurance," we push the possibility of dying back into some dark and dusty corner of our minds while we get on with the business of living.

Kids have a way of growing up while we're not looking. We move up in the world and move into bigger, more expensive houses. Quite likely we live in a different part of the country now from where we first began our insurance program. We may even have lost track of our friend who helped us get our insurance program started. As times and circumstances change, so do our insurance needs.

Johnny may be in college now, with Judy ready to start in another year. Perhaps you've been thinking about starting your own business or expanding an existing one, but you've delayed because of the high cost of borrowing money. You can look to life insurance as a possible source of funds to help finance your current plans. How can life insurance help you do this? You realize you still have a real need for insurance coverage.

Wants, Haves, and Needs. When you were just getting started, your assets were small. By now your net worth has grown considerably through the years, and you've built a significant "living estate" through wise investment of some of that economic potential you've realized over the years. Insurance no longer has to carry the entire burden of providing financial protection for your family.

But how can you figure out how much coverage you need? Do you have enough? Too much? How much should it cost?

There are several ways to estimate your insurance needs. The simplest method is to multiply your annual salary by ten. This method is a good yardstick and includes some built-in margin for inflation. Most insurance companies also have forms that allow you to do a more detailed analysis.

In general, the idea is to take your present monthly salary and multiply it by 70 percent (75 percent if you have more than two children). The purpose of this step is to give you an idea of the amount your family would need in order to maintain their current standard of living. Subtract from this amount any Social Security payment they might receive. What's left is the amount of dollars your family will need each month.

Monetary Tides. Where will that money come from? The answer depends on the size of the liquid investments in your living estate. It also depends on the continuance of the Social Security program. Don't include home furnishings or nonliquid assets (such as your residence) when calculating this amount.

To arrive at the total dollars needed, divide twelve months by the interest rate you think your money could earn. Then multiply by the dollar amount left after deducting any Social Security payment. The result is the amount of capital required to produce that amount of dollars needed monthly.

Subtract from this your liquid living estate. The remaining capital needed may be further adjusted up or down by other factors, such as changes in college expenses. The result is the dollar amount of insurance you need in order to cover the balance of your family's financial needs.

How much should this needed insurance coverage cost? *As little as possible* is the most sensible answer to most of us.

Just as auto insurance can be purchased to cover various things—liability, collision, theft, and so on—or home owners' insurance to cover fire, theft, or replacement of contents—life insurance comes in many varieties: whole-life, twenty-payment life, family plans, level term, decreasing term, and so forth. Policy types offered by insurance companies change from time to time as well.

Pumping Bucks. Unlike other types of insurance, most life insurance policies contain a cash build-up. In essence, this is a form of banking and not a pure insurance purchase. If your present life insurance policies contain some of the features of a bank, then you definitely are not paying the least amount possible for your present amount of coverage. On the other hand, you may have discovered a source of capital that you could use for other purposes.

It's time to dig out all your insurance policies—and those of your spouse—and to plug in your computer. Read lightly through your policies. Look on the front to see when the coverage began. Look inside to find the cash value table. It's usually near the back.

Sometimes the cash value is stated "per $1,000," rather than as a sum total of the policy value. For example, if you bought a policy in November 1972, it's now ten years old. Look down the *years* column to 10 and across the row to the column that lists the cash value. If it's given as an amount "per $1,000," multiply it by the number of the thousands of the face amount of the policy to arrive at the total cash value. You'll want to do this for each policy you hold. If you have more than one policy, your computer and spreadsheet program will be a big help as you analyze your current insurance position.

You'll want a column to identify which policy the data references. Some of the items you'll want to list for each policy are policy number, face amount of the basic policy, cash surrender value, loan rate, actual insurance, annual premium, and last year's dividend. Other items you may find educational are net premium, lost earnings on cash value, total insurance cost, cost per $1,000, and the mortality table used.

Riders on the Form. You will want to list the cost associated with each rider as an entry separate from the cost of the basic policy. Riders include such things as family plan add-ons that insure your spouse and children, decreasing term riders, and waiver of premium. Costs for these riders are usually listed separately on the front of the policy. Set up a separate worksheet for those policies on the life of your spouse to be sure you are not underinsured in that area.

Figure 1 (page 28) contains some headings you may not be familiar with, so let's take a brief look at them here.

Face amount: Basic insurance amount; usually found on the front page of the policy.

Cash value: Amount found in the cash value table of the policy—if it is a cash-building type of policy. Many policies state it as an amount per $1,000 of face value.

Loan rate: If your concern is borrowing funds from life insurance, you'll be interested in the cost of borrowing those funds.

Actual insurance: Face amount of the policy, less the cash value; this number represents the amount of real insurance you've purchased.

Dividend last year: Amount of overpayment of premium. Rate of return is dependent to some extent on how well the insurance company invested your overpayment dollars.

Net premium: Annual premium less dividend paid.

Lost dollars at 7 percent: The percentage (which you specify) times the cash value represents what you think you could have earned on your money if you had saved it on your own and invested it directly.

Total cost: This is the total of the previous two items, representing the amount you spent out of pocket plus the amount you could have earned but didn't; the latter is sometimes called the *lost opportunity cost.*

Mortality table: The actuarial table in effect at the time your policy was issued.

Now that you know the cost of your present insurance policies and the amount of protection each provides, what's the next step? Let's create a replacement cost section on the same worksheet.

Under the Actuarial Table. These numbers represent a one-year level renewable term policy for a particular insured person and a particular company. The replacement insurance coverage displayed here is only one of several possibilities from which you can choose. You may wish, for reasons of your own, to take out a new but larger whole-life policy whose rates are based on the latest available actuarial table.

Or you might prefer a five-year level renewable term policy. This type of coverage costs more the first few years but less the last few years than a comparable one-year renewable policy. Some families prefer budgeting for a five-year renewable policy because the amount due each year is more static than the amount due on a one-year renewable policy.

As you can see from figure 2, the premium on a one-year renewable policy increases each year. The numbers are displayed in this figure only for the first ten years. While policies of this sort are usually written for a fifteen-year period, the premiums increase so dramatically for the last five years that you might find it prudent to take out another new policy in the tenth year (if you're still insurable) rather than continue with the existing policy. More than likely a new and more favorable mortality table will be in effect by then anyhow.

Should you replace your existing coverage? If *any* of the following conditions are true of you, the answer is yes:

1. You have more than one insurance policy on your life. There is an administration fee built into or added onto each policy. There is also an additional first year fee applied to most new policies.

2. You are using your life insurance as a substitute for a savings bank by building cash value in your policies (equity).

If your budget is stretched so thin and your will power and ability to "pay yourself first" are not very strong, then banking at the insurance office is better than no banking at all. But today many of the larger companies have automatic payroll deduction plans for their employees. Some even match 50 to 75 percent of the employee's contributions to such savings plans. The philosophy behind the "banking" aspect of insurance was that you would never miss what you couldn't spend. True though that may be, you can use the same principle today at other institutions and get a greater return.

3. Your policies were written on a mortality table that's now out of date.

Historical Experiences. The first mortality table used by the insurance industry was the American Experience Table and was based on statistics gathered between 1843 and 1858. Those statistics represent the

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	A	B	C	D	E	F	G	H	I	J	K	L	M
1		YOUR LIFE INSURANCE WORKSHEET				REVIEWED: NOV. 1982							
2													
3	POLICY #	FACE AMT.	CASH	LOAN RATE	ACTUAL	ANNUAL	DIVIDEND	NET	LOST $ AT	TOTAL	COST PER	MORTALITY	POLICY
4			VALUE		INS.	PREMIUM	LAST YR.	PREMIUM	7 PERCENT	COST	THOUSAND	TABLE	TYPE
5													
6	32-782-154	7500.00	2487.00	5%	5013.00	181.68	128.34	53.34	174.09	227.43	4.54	CSO-1941	FAMILY
7	33-094-978	5000.00	1395.00	5%	3605.00	117.60	74.05	43.55	97.65	141.20	3.92	CSO-1941	WHOLE LIFE
8	33-808-355	50000.00	9900.00	5%	40100.00	1048.50	445.00	603.50	693.00	1296.50	3.23	CSO-1958	WHOLE LIFE
9													
10	TOTALS:	62500.00	13782.00		48718.00	1347.78	647.39	700.39	964.74	1665.13			
11	(CURRENT)												

Figure 1.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	REPLACEMENT PLAN:	NOV. 1982											
2													
3	POLICY #	FACE AMT.	CASH	LOAN RATE	ACTUAL	ANNUAL	DIVIDEND	NET	LOST $ AT	TOTAL	COST PER	MORTALITY	POLICY
4			VALUE		INS.	PREMIUM	LAST YR.	PREMIUM	7 PERCENT	COST	THOUSAND	TABLE	TYPE
5													
6	NEW POLICY	100000.00	0.00		100000.00	408.00	0.00	408.00	0.00	408.00	0.41	CSO-1980	RENEW.TERM
7	YR 2	100000.00	0.00		100000.00	387.00	0.00	387.00	0.00	387.00	0.39		
8	YR 3	100000.00	0.00		100000.00	419.00	0.00	419.00	0.00	419.00	0.42		
9	YR 4	100000.00	0.00		100000.00	464.00	0.00	464.00	0.00	464.00	0.46		
10	YR 5	100000.00	0.00		100000.00	513.00	0.00	513.00	0.00	513.00	0.51		
11	YR 6	100000.00	0.00		100000.00	570.00	0.00	570.00	0.00	570.00	0.57		
12	YR 7	100000.00	0.00		100000.00	633.00	0.00	633.00	0.00	633.00	0.63		
13	YR 8	100000.00	0.00		100000.00	708.00	0.00	708.00	0.00	708.00	0.71		
14	YR 9	100000.00	0.00		100000.00	792.00	0.00	792.00	0.00	792.00	0.79		
15	YR10	100000.00	0.00		100000.00	892.00	0.00	892.00	0.00	892.00	0.89		
16													
17	10YR TOTAL	100000.00	0.00		100000.00	5786.00	0.00	5786.00	0.00	5786.00			

Figure 2.

death rate of Abe Lincoln's day. This table was replaced by the Commissioners' 1941 Standard Ordinary Table, which was based on statistics of 1930 to 1940.

In 1966, insurance companies began using the Commissioners' 1958 Standard Ordinary Table, based on statistics between 1950 and 1954. This table, sometimes referred to as the CSO Table, is an improvement over previous rate tables. With improved health care and modern medical science, our life expectancy is much longer than in Abe Lincoln's day. If you have policies written on old tables, you may be paying as much as two or three times too much for your coverage.

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4. You have "participating" policies.

A participating policy is one in which you are paid an annual dividend on the anniversary date of the policy. Unlike the dividends you may receive from shares of stock that you hold, insurance dividends have been ruled to be a partial return of *overpayment of premium* and, therefore, are not taxed the way stock dividends are taxed.

If you look at the dividend returned on the cash-value policies shown in figure 1, you'll note that they represent a comparatively low rate of return. Even for someone in a 50 percent tax bracket, the first policy listed yields only 7.74 percent, the second 7.96 percent, and the third 6.74 percent. The fact that life insurance dividends are not taxed shouldn't be given more merit than it actually deserves.

Are there any circumstances under which you *shouldn't* replace your present coverage. You bet there are.

Examining the Possibilities. The most important reason is uninsurability. Always get your new policy before you part with the old ones. You are not completely assured of the new coverage until after you have been examined, found physically acceptable, and have been issued the new policy. Merely filling out some forms and writing a check in payment as a binder are not an adequate guarantee. Only the actual issuance of the new policy by the insurance company is sufficient.

If you can't lower your cost per $1,000 by getting new coverage, there's no sense in changing your existing coverage. If you're planning to commit suicide within the next two years, there's usually an exclusion paragraph that says the insurance company won't pay up on that type of claim.

Your present policies may contain features that are important to your current plans—such as paid-up additional insurance, extended term, annuity options, and waiver of premiums. You'll have to weigh each of these features to determine if better alternatives are available.

If you bought your policy from a friend and fear you might risk cashing in the friendship along with the policy, you may chalk up the difference in premiums paid as a cost of the friendship.

Real Life. The numbers in the foregoing figures are taken from actual policies in existence for a real family. Their goals in reviewing their coverage at this time were to consolidate coverage, decrease premium costs, and free cash for other investments.

The family exchanged three policies for one new policy of $100,000. The exchange increased their insurance coverage by $37,500 while releasing $13,782 in cash value. Premium expense was reduced in the first year by $939.78, with figures for a ten-year premium schedule reflecting a projected savings of $7,691. ▲

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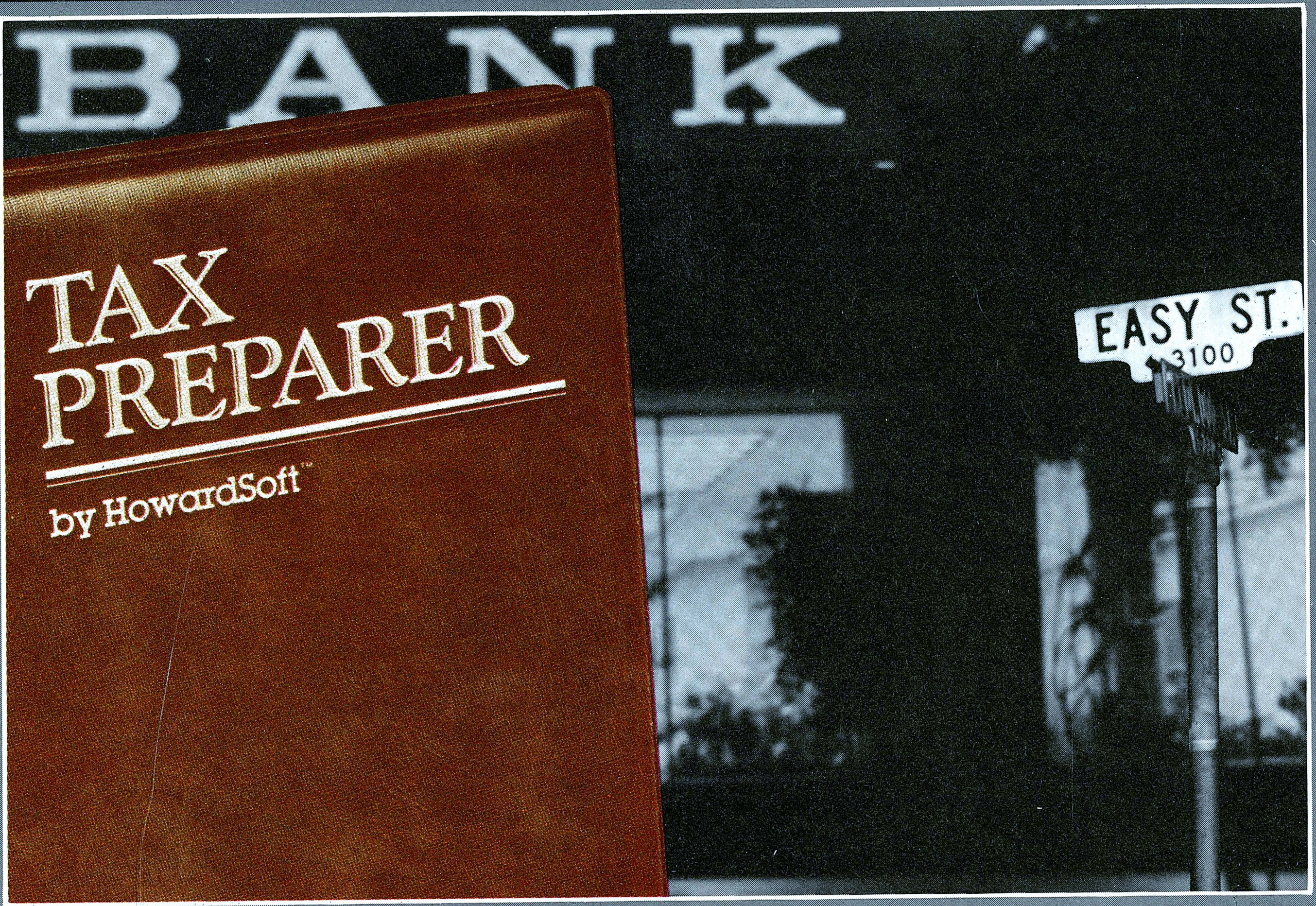

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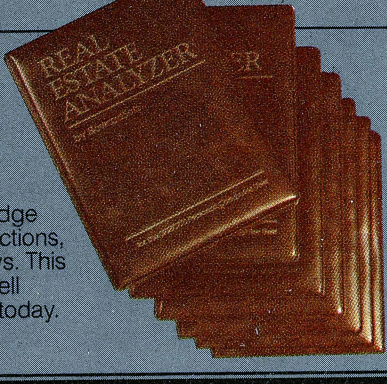

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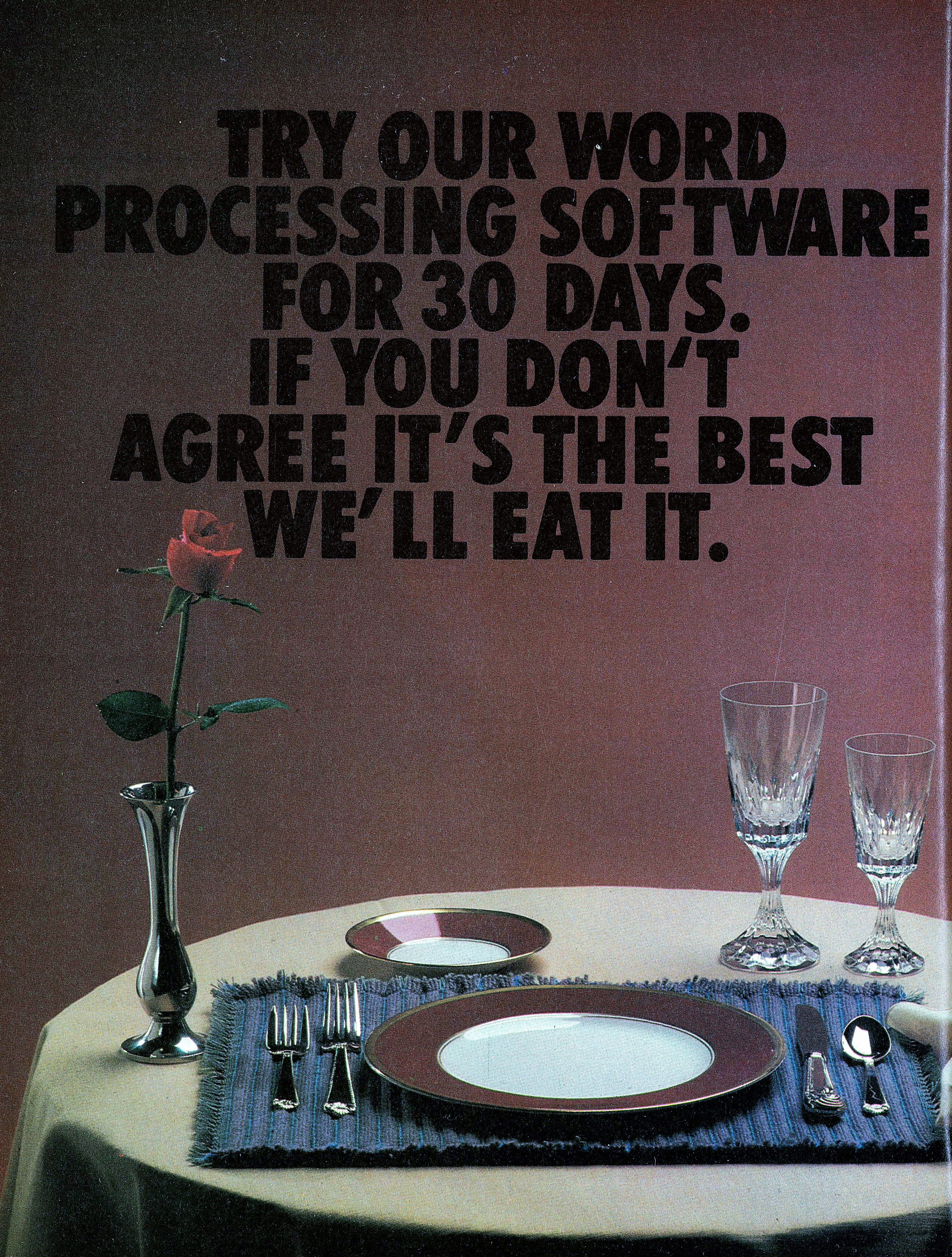
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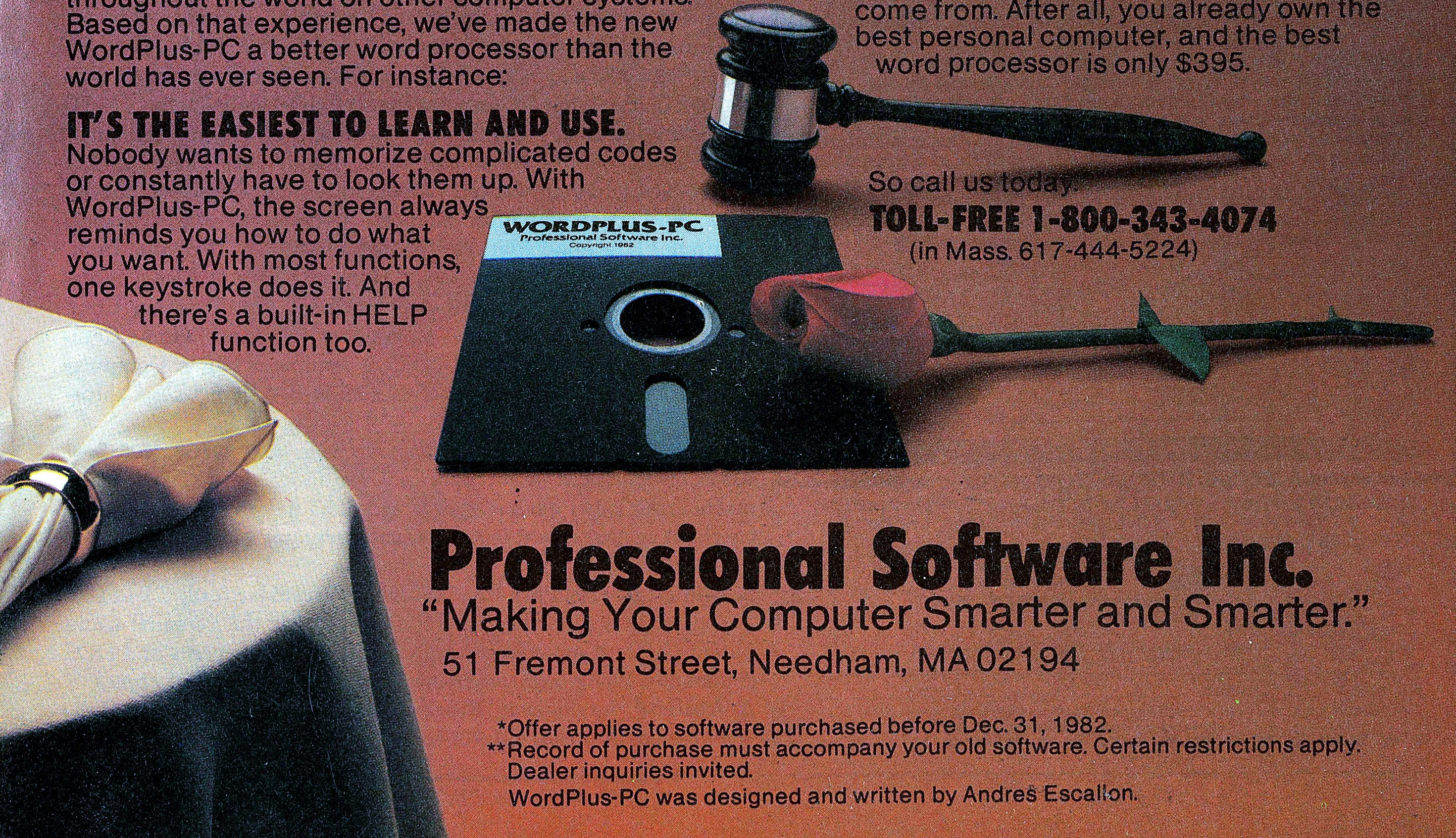

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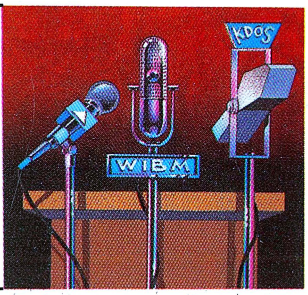

Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233) has published *Basic Exercises for the IBM Personal Computer*, a book that includes programming exercises in mathematics, physics, games, business, accounting, and statistics. $13.95.

Δ **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000) is having a "Get-3-and-1-of-Them-Is-Free" promotion, running until December 31. VisiCorp's line of programs includes *VisiCalc, VisiCalc Business Forecasting Model, VisiTrend/Plot, VisiDex, VisiFile, VisiSchedule,* and *DeskTop/Plan.*

Δ **Gryphon Microproducts** (Box 6543, Silver Spring, MD 20906; 301-946-2585) offers an expanded function program for *dBase II*, named *dBRx*. It includes exponentiation, square roots, trigonometric functions, and commands to remove spaces from strings. $150.

Δ **Management Technology** (Box 6075, Denver, CO 80206; 303-629-5778) sells an *IBM-PC Conversion Handbook* that includes a guide for converting Apple, TRS-80, and Pet Basic programs for the IBM. $8.95.

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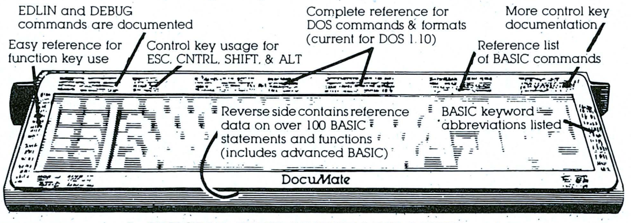
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Δ **SAFT America** (931 Vandalia Street, Saint Paul, MN 55164; 612-645-8531) offers a standby power system that will keep your computer going in a blackout for twenty minutes. $600.

Δ **Lands End Computers** (Box 872, Calistoga, CA 94515; 408-286-2970) has an audio cassette program called *From Out of the Box to Up and Running*. It gives step-by-step instructions on setting up a Personal Computer, turning it on, identifying the keys, using DOS, and running programs. $69.

Δ **Sapana Micro Software** (1305 South Rouse, Pittsburg, KS 66762; 316-231-5023) has released two new programs: *Mail Track* can store 1,100 labels in zip code order on a single-sided disk, or 2,200 on a double-sided disk. Requires printer. $29. Δ *Expense Track*, a personal expenses record, stores payments by date, description, category, method of payment, tax status, and amount. Requires eighty-column display. $29.

Δ **Persoft** (2186 U.S. Highway 51, Stoughton, WI 53589; 608-873-8888) has announced *TE100*, a software package that allows a pc to emulate a DEC VT100 series terminal. Requires asynchronous card. $125.

Δ **Venice Woodworking Company** (12810 Venice Boulevard, Los Angeles, CA 90066; 213-390-4885) has a line of solid-oak furniture designed for microcomputers, including a set of two drawers that stores up to 340 floppy disks ($279.95) and a rack that can hold up to six disks upright ($31.95).

Δ **Micro Synergy** (1327 Whitacre Drive, Clearwater, FL 33516; 813-535-6655) offers a 64K-512K RAM board. $350—$1,080.

Δ **Westwood Software** (1670 N.W. Emperor Drive, Corvallis, OR 97330; 503-745-5500) has released *Micro-Football*, a graphics game that allows the player a choice of fourteen offensive plays and four defensive formations. Requires color/graphics adapter. $29.95.

Δ **Future Computing** (900 Canyon Creek Center, Richardson, TX 75080; 214-783-9375) is giving a series of computer seminars in Dallas, Texas: "Home Computer Market" (December 6-7), "UCSD p-System Industry" (January 31-February 2), "Unix Industry" (February 2-4), "Personal Computer Retail" (February 23-25), "Personal Computer Market: Opportunities and Pitfalls" (June 13-15), "IBM PC-Compatible Market" (August 29-31), "Personal Computer Education Market" (September 29-31), "Personal Computer Distribution: Systems Houses/OEMs/VARs/Wholesalers/Distributors" (October 31-Nobember 2), "Personal Computer Distribution: Retailers" (November 2-4), and "Home Computer Market" (December 7-9). One seminar, "Home Computer Market," will also be held March 21-22 in San Francisco, California. Call for prices.

Δ **Force Technology** (Box 20955, San Jose, CA 95160; 408-268-3359) offers *Palcad*, a software tool for designing PAL (programmable array logic) devices. *Palcad* accepts a design as an input file, checks it against a function table, and generates a variety of output files. $495.

Δ **Minimagic** (104 Park Road, Suite 34, West Hartford, CT 06119; 203-233-6261) publishes a reference card for the Personal Computer. The card includes a summary of Basic statements and DOS commands, along with other information. $150 per 100 copies.

Δ **Artificial Intelligence Research Group** (921 North La Jolla Avenue, Los Angeles, CA 90046; 213-656-7368) offers a version of

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the venerable *Eliza* program, which emulates the dialogue of a nondirective psychotherapist. $25.

Δ **Wespercorp** (14321 New Myford Road, Tustin, CA 92680; 714-730-6250) produces a 16K spooler card that is expandable to 64K. $289 for parallel printer version; $349 for parallel/serial version.

Δ **Scitor** (710 Lakeway, Suite 290, Sunnyvale, CA 94086; 408-730-0400) has announced *Project Scheduler*, a program that juggles such factors as labor, costs, and holidays to forecast project status. Requires 192K. $285.

Δ **Arlington Software** (97 Bartlett Avenue, Arlington, MA 02174; 617-641-0290) sells a *Personal Computer Home Management System* database designed to store such things as names, addresses, phone numbers, home inventory, medical records, and insurance. $89.95. Δ *Auto-Dialer*, the first expansion for PCHS, reduces dialing to a single keystroke. Requires Hayes Stack Smartmodem. $69.95.

Δ **Computer Control Systems** (298 Twenty-first Terrace, Largo, FL 33541; 813-586-1886) has released two utilities, *Fabs* and *Autosort*. The former is a high-speed index file handler employing a balanced B-tree algorithm; the latter is an assembly-language program providing sort/merge/select functions for very large data files. Both will run under PC-DOS or CP/M-86. $150 each.

Δ **Inner Loop Software** (Box 45857, Los Angeles, CA 90045; 213-645-5162) has a graphics terminal emulator called *VDTE*. It provides a 640 x 200 grid in graphics mode. $50.

Δ **Versa Computing** (3541 Old Conejo Road, Suite 104, Newbury Park, CA 91320; 805-498-1956) is the creator of *VersaWriter*, a digital drawing tablet with more than a hundred color options. Graphics created with *VersaWriter* can be saved to disk and printed out. $299.

Δ **Digital Engineering Group** (11999 Katy Freeway, Suite 150, Houston, TX 77079; 713-531-6100) has announced *Perfin*, a personal finance program with expense analysis and budgeting features. Requires eighty-column screen. $65.

Δ **Star Value Software** (12218 Scribe Drive, Austin, TX 78759; 512-837-5498) has released the investment program *Stockvue*. It displays investment information in a spreadsheet format, allowing detailed calculation of risk and potential profit. Requires 48K and an eighty-column screen. $129.95.

Δ **The Computer Workshop** (322 Shelden Avenue, Houghton, MI 49931; 906-482-8009) has announced *TCW/DMS*, a data management system that allows a novice to set up, for example, a mailing list or inventory system. Requires two drives. $359.

Δ **Hi-Tech Systems** (3985 North State Road 39, Lebanon, IN 46052; 800-428-4403) manufactures a transient suppression system that can protect your computer from current surges. $350.

Δ **Osborne/McGraw-Hill** (630 Bancroft Way, Berkeley, CA 94710; 415-548-2805) has published *Armchair Basic*, a programming book for beginners who do not have access to computers. $11.95.

Δ **Eagle Software Publishing** (110 West Lancaster Avenue, Wayne, PA 19087; 215-964-8660) has released *Money Decisions Volume II*, a package of thirty-six business and financial problem-solving routines that can be used independently or with the earlier product. Requires eighty-column screen. $229. Both volumes $399.

Δ **Decision Resources** (44 White Birch Road, Weston, CT 06883; 203-222-1974) has expanded its *Chart-Master* program, intended for use with Hewlett-Packard plotters. The new *Chart-Master* allows the user to control the size and position of each chart, plot up to nine charts per page, select typefaces, and specify the scaling of each axis. $375.

Δ **Vertical Data Systems** (1215 Meyerside Drive, Unit 2, Mississauga, Canada L5T 1H3; 416-671-1752) sells a line of converters that allow Olivetti and IBM typewriters to act as printers. Price range: $121—$325.

Δ **Atlantic Software and Engineering** (Box 14654, North Palm Beach, FL 33408) offers *Color Graphics Printer*, which prints the contents of a screen buffer to an IDS Prism printer. The program allows printer colors to be mapped to the screen. $29.95.

Δ New from **N.F. Systems** (Box 76363, Atlanta, GA 30358; 404-252-3302): *FileMaster*, a file management system that includes a feature allowing the conversion of *VisiCalc* files. $99.95. Δ *TextMaster*, a formatting utility that can be used to produce customized form letters, reports, and documentation. $99.95. Δ *ScreenMaster*, a utility programmers can use to create displays and menus in color. $79.95 Δ *CompareMaster*, which compares two files and reports all differences in character or hexadecimal format. $34.95. All require an eighty-column screen.

Δ **Analytic Systems** (24 Old Kings Highway South, Darien, CT 06820; 203-655-7426) markets a financial statement spreading system designed for bankers named *Key/Spread*. It is designed for credit department employees with no previous experience and comes with a training seminar. Requires 128K and two drives. $5,000.

Δ **Term Computer Services** (Box 725, New Providence, NJ 07974) has announced the *Mr. Math Arithmetic Tutor*, a program intended for grades one through five. Has ten levels of difficulty. $29.95.

Δ **B & L Computer Consultants** (226 South Cole, Boise, ID 83709; 208-377-8088) offers the utility programs *Electronic Disk* and *New Reset*. The first uses 160K RAM as an electronic disk, referenced as drive C (256K total RAM recommended). The other provides two additional types of resets: one that does not erase memory and one that does not involve rebooting or memory erasure. Both programs are free to anyone who sends in a disk and a self-addressed, stamped envelope. Otherwise just send $6. Donations of $15 (for *Electronic Disk*) and $10 (for *New Reset*) are requested from those who find the programs useful.

Δ **CompuView Products** (1955 Pauline Boulevard, Suite 200, Ann Arbor, MI 48103; 313-996-1299) has an enhanced version of CP/M-86. The new version features horizontal scrolling, screen

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But before you settle for Wordstar, remember that—whatever system you choose—you'll be using it for a long time. So your decision should be based on *system performance*—not what the dealer happens to have on hand.

That's why you should look into PowerText.

Quite simply, PowerText will do far more for you than Wordstar.

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Ask if Wordstar automatically styles your copy for any kind of document you write. Can you tell Wordstar, "This is a letter," and then get a perfect letter, with the date, name and address, salutation, and closing exactly where you want them to be—automatically?

Does Wordstar produce memos, reports, presentations, and scripts in precisely the formats you want without your ever having to worry about where the words go on the paper?

Well, Wordstar *doesn't* do those things for you. But PowerText *does*.

That means with PowerText you can concentrate on what you're writing, not on printed style. You always get a beautiful, perfectly formatted document—automatically.

Just think of how much time and effort these remarkable capabilities will save you. It's almost like dictating to your computer.

PowerText gives you automatic margins. Indents. Spacing. Title page. Envelope or label.

Automatic justification. Centering. Variable pitch. Pagination. Table of contents.

And truly *intelligent* page breaks. (You'll never end up with "Yours truly," all by itself on the last page of your letter.)

And an enormously useful feature that automatically indents and numbers for you when you write numbered paragraphs—a great time-saver when you're doing outlines, reports, or questionnaires.

Plus columnar capabilities so sophisticated and flexible they can handle just about any problem you can think up.

Ask if Wordstar gives you all these features. (It doesn't.)

Of course, both PowerText and Wordstar give you complete editing capabilities. All good word processing systems do.

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And PowerText gives you automatic headers and footers. *And* boxed copy. *And* print macros. *And* automatic footnote numbers. *And* boilerplate inclusion. *And* vertical and horizontal border lines. *And* 132-character lines. *And* superscripts and subscripts.

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PowerText is a run-time, bootable system. It requires at least 64K of memory, two disk drives, and a printer. It supports both serial and parallel printer interfaces, extended memory, and RAM disk.

And, oh yes, be sure to ask your dealer about Wordstar's warranty. (It doesn't have one.)

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State __________ Zip __________

line editing, and other improvements. $285. With support for double-tracking drives, $325.

Δ **Software Technology for Computers** (Box 428, Belmont, MA 02178; 617-923-4334) has released a program generator called *The Creator*. It allows a person with no knowledge of programming to produce a Basic program simply by answering questions in English, "leaving only a few statements at most to input." Requires two drives. $300.

Δ **Nelson Data Resources** (900 South Seventy-fourth Plaza, Suite 118, Omaha, NE 68114; 402-397-3030) is the creator of *Lazycoder-Screen*, a program that lets you design images on the screen and then save them or print them out. $125.

Δ **American Integrity Systems** (1415 East McFadden Avenue, Suite A, Santa Ana, CA 92705; 714-973-4756) has presented a *Management Accounting Series* for CP/M-86. The package includes accounts payable, accounts receivable, general ledger, inventory control, sales order entry, and word processing. Requires eighty-column screen. $3,675. Individual modules available separately.

Δ From **Single Source Solution** (2699 Clayton Road, Concord, CA 94519; 415-680-0202): *Interactive Resume*, which permits resumes to be tailored to the particular opportunity. Requires 48K and a printer. $49.95. Δ *Xref*, a program to cross-reference Basic programs. $39.95.

Δ **Morgan Computing Company** (10400 North Central Expressway, Suite 210, Dallas, TX 75231; 214-739-5895) has released *Math Wizard*, a gamelike arithmetic drill for elementary school children. Requires 48K. $39.95. Δ *Copy Protector*, a utility that prevents unauthorized duplication of Basic programs. $75.

Δ **Norell Data Systems** (3400 Wilshire Boulevard, Box 70127, Los Angeles, CA 90010; 213-257-2026) has added a word processor to its product line. *Easyword* combines a full-screen editor with a format processor into a powerful word processing program. It has split-screen capability and can handle files too big for available RAM. Requires printer. $149.95.

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Complete FORTH program development systems for the IBM® Personal Computer. Packages include interpreter/compiler with virtual memory management, line editor, custom screen editor, assembler, decompiler, utilities, file and record access modules, and many demonstration programs. 150 page user manual. $100.00

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Δ **Diamond Head Software** (2937 Kalakaua Avenue, Suite 28, Honolulu, HI 96815; 808-922-1113) offers *Stock Charting*, a program that can record, chart, and print the prices of a portfolio of up to twenty stocks. Requires color/graphics adapter. $49.95.

Δ **Quest Research** (Box 2553, Huntsville, AL 35804; 800-558-8088) has released *Forth-32*, a software development system which allows the programmer to address a full megabyte of memory. The *Forth-32* package includes a compiler, a decompiler, an assembler, a full-screen editor, a debugger, a graphics utility, and a package-building utility. $100. Δ *Floating Point Package* includes math functions and an assembler that includes op-codes for the 8087. $50.

Δ **PBL** (Box 559, Wayzata, MN 55391; 612-473-3769) has upgraded its *Personal Investor* program, which is designed to interface with the Dow Jones News/Retrieval service to collect quotations, update portfolios, and retrieve business information. The new version will automatically collect quotations on options, bonds, mutual funds, and treasury bills. It will also talk to *VisiCalc* and other programs via a data interchange feature. Requires 128K and modem. $145. Upgrade $10.

Δ **Pacific Data Systems** (6090 Sepulveda Boulevard, Culver City, CA 90230; 213-559-8713) has announced the accounting program *Moneytrack*, designed to maintain transaction records and prepare reports for small businesses or individuals. Requires two double-sided drives. $450.

Δ **3Com** (1390 Shorebird Way, Mountain View, CA 94043; 415-961-9602) has a line of products designed to combine Personal Computers into an Ethernet local network: EtherLink, an expansion board that enables a pc to function as an Ethernet terminal. $950. Δ *EtherShare*, a network server with a 10M Winchester disk, allowing terminals to share text files and programs. $11,500. Δ *EtherPrint*, a program allowing the terminals to share a single printer, with a spooler feature that queues up files for output. $750. Δ *EtherMail*, a program enabling the transfer of electronic messages between terminals. It has its own editor. $1,500.

Δ **Heigen** (Box 15163, San Francisco, CA 94115; 415-398-8050) offers *Ramsak*, a machine-language arcade game that can be played on a monochrome or color display monitor. $29.95. Δ *Supermailer II*, a menu-driven mailing list program. $29.95.

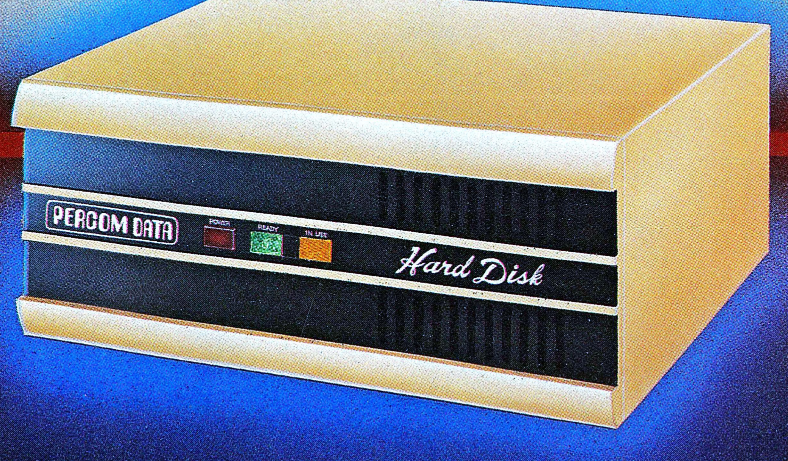
Δ **Cuesta Systems** (3440 Roberto Court, San Luis Obispo, CA 93401; 805-541-4160) sells the power supply Datasaver. In event of a current interruption, it switches to battery within one-hundredth of a second and maintains power for five minutes. $695.

Δ **Business Planning International** (13139 Silver Saddle Lane, Poway, CA 92064; 714-487-2724) sells Biz-Plan, a business forecasting and planning system with automatic consolidations and financial reports. The package includes a Personal Computer with 256K RAM, a monitor, a printer, PC-DOS, five programming languages, *WordStar*, and the Biz-Plan software. $7,500.

Δ **Apparat** (4401 South Tamarac Parkway, Denver, CO 80237; 303-741-1778) has lowered the price of its printer spooler. The 64K spooler is compatible with both serial and parallel printers. The new price is $319.

Δ **Personal Computer Products** (1400 Coleman Avenue, Suite C-18, Santa Clara, CA 95050; 408-988-0164) has released *Omegabug*, a ten-stage arcade game with four speeds. $29.95.

Δ **PC Squared** (1250 Oakmead Parkway, Box 678, Sunnyvale, CA 94086; 408-749-9313) is offering a rebate program for purchasers of its internally mounted Winchester disks. Return your old TM100-2 floppy drive and they will send you $100. The PC Squared drives are 6M ($1,895), 12M ($2,195), and 18M ($2,695). Controller, $950. Δ Also from PC Squared: 64K-256K RAM boards, $249—$636. Δ Combination RAM/asynchronous communications boards, $289—$736. ▲



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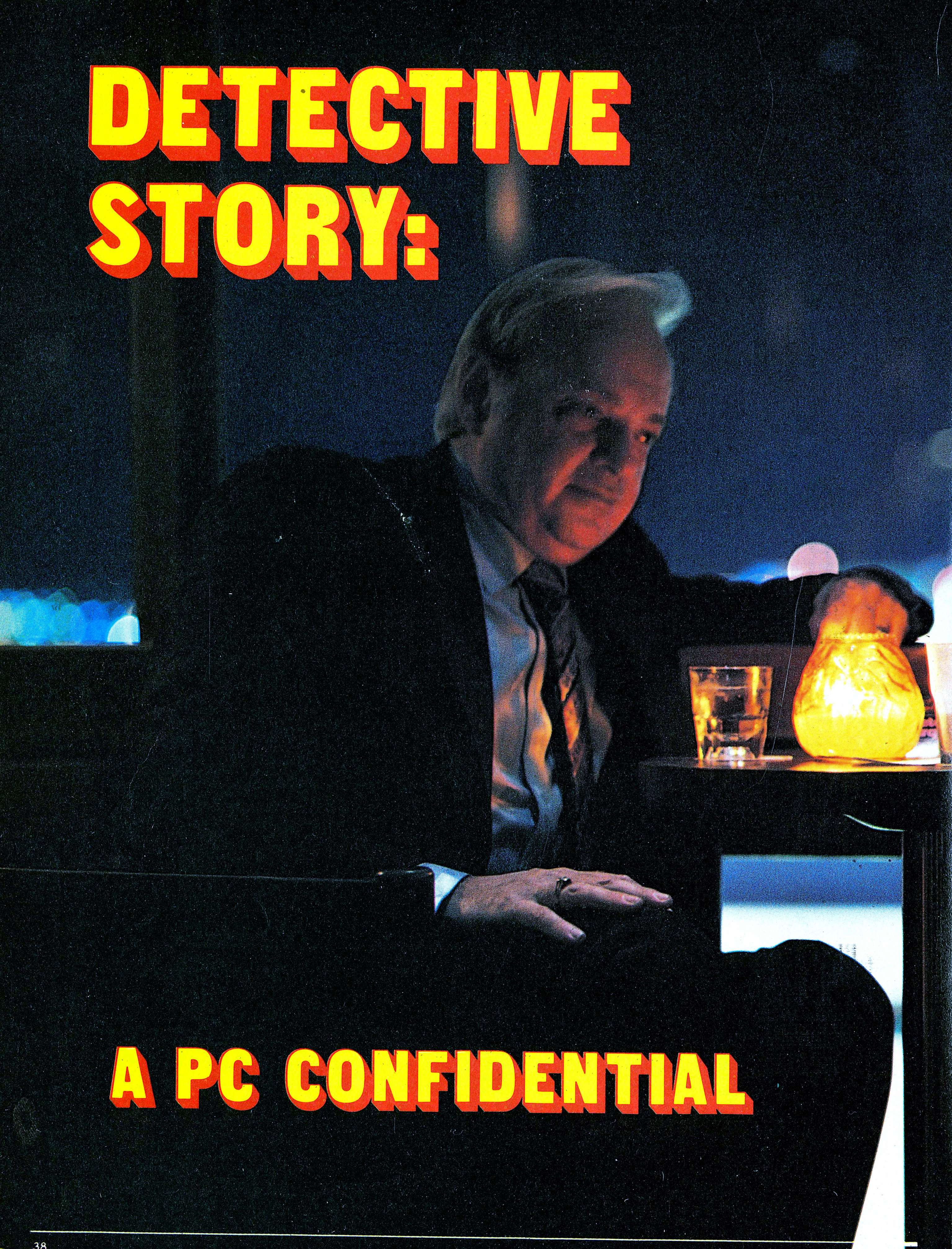

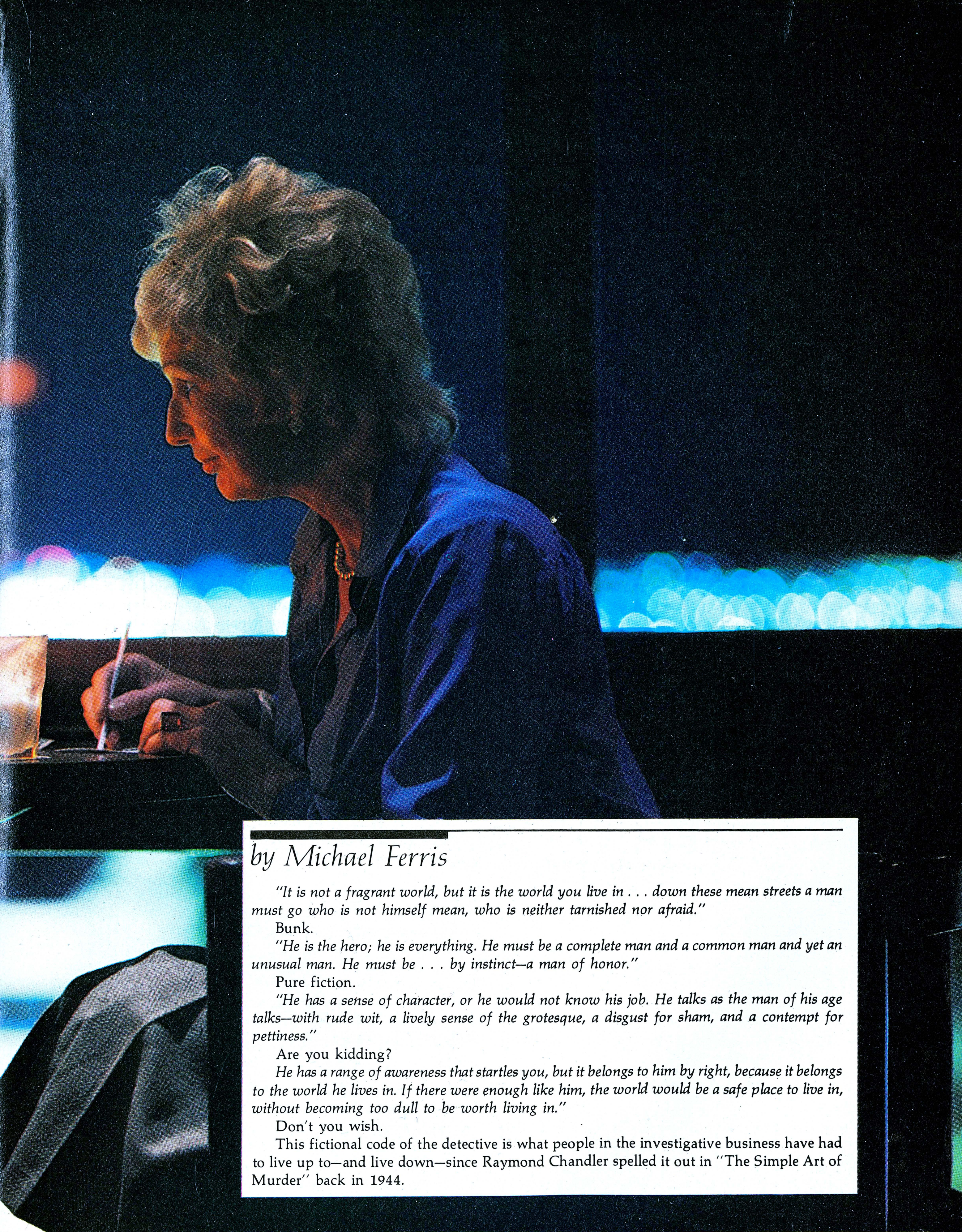

by Michael Ferris

"It is not a fragrant world, but it is the world you live in . . . down these mean streets a man must go who is not himself mean, who is neither tarnished nor afraid."

Bunk.

"He is the hero; he is everything. He must be a complete man and a common man and yet an unusual man. He must be . . . by instinct—a man of honor."

Pure fiction.

"He has a sense of character, or he would not know his job. He talks as the man of his age talks—with rude wit, a lively sense of the grotesque, a disgust for sham, and a contempt for pettiness."

Are you kidding?

He has a range of awareness that startles you, but it belongs to him by right, because it belongs to the world he lives in. If there were enough like him, the world would be a safe place to live in, without becoming too dull to be worth living in."

Don't you wish.

This fictional code of the detective is what people in the investigative business have had to live up to—and live down—since Raymond Chandler spelled it out in "The Simple Art of Murder" back in 1944.

Farewell My Lovely. Ask a lawyer and he'll tell you law is not like Perry Mason. Ask a detective and he'll tell you there are no more Philip Marlowes.

Today, disregarding all the literary heroics, the detective business is facts. Lots of 'em. With some excitement in between the statistics. Any job that involves casing somebody who doesn't want to be cased or digging up dirt that wants to stay buried is going to have risks.

As well as rewards. The thrill of collating and dovetailing what seem to be random facts—the who, what, when, where, and why of it all—into revealing patterns of information.

Their card reads "Professional fact finding." The firm's initials, embossed, seem to disappear. You can feel the presence of the letters A.I.C., but you can't really see them with the naked eye. A suitable calling card for a pair of detectives.

Al and Ruth Kaplan are private investigators. Las Vegas is their beat. They serve the business, gaming, and legal communities, as well as John Q. Public. Twenty-four hours a day, seven days a week.

The charge: thirty dollars an hour plus expenses. Aside from the two of them, the only regular worker in their office is an IBM pc. Everybody else is either part-time or on call.

This is their story. It's like the town—exciting. Witness the circumstances surrounding a reporter's meeting with the Kaplans.

A time and location is squeezed into one of their eighteen to twenty hour days. At the last minute, the route to be taken is changed.

Murder My Sweet. It seems Ruth was shot at a few days ago and

The
Fashion
Show

A PC LIGHTS LAS VEGAS

They give the Las Vegas skyline its sizzle.

The huge pink clown that holds the words *Circus Circus*. The cool columns and scrollwork that front Caesar's Palace. Effervescent diamonds of excitement radiating in the sky over the Stardust. The glitzy palm trees that wrap around The Dunes.

These are the true stars of Las Vegas—the great hotel/casino marquee signs that line the famous gambling strip. "Glitter Gulch," the natives call it.

Human-sized stars pale in comparison to the gigantic displays. Only their names in twenty-foot letters can compete against the spectacle of the giant signs that spike the desert sky. Up close you realize what true giants the signs are: some measure two or three car lengths wide and twenty stories high. Amazing! And they're so skinny, only eight or ten feet deep. Block after block of the hulking, bright, metal beasts. Placed so close together they overlap into one mesmerizing electric wave luring you to gambol on the concrete beach.

Riveting. Looked up to. Bigger than life. The marquees shout Sinatra (Nancy and Frank), loose slots, Siegfried and Roy (the amazing), 97.5 percent return, and the fabulous 99-cent breakfast.

They're talked about. Witty. Millions of twinkling bulbs, acres of milky plexiglass, and jazzy miles of heat-shaped neon.

Most of all, they're fun. And they're fussed over. Spoiled by constant loving care and maintenance.

True stars.

"The first thing a sign has to do is attract your attention," says Ken Moultray of Sign Systems, the largest locally owned sign manufacturing company in Las Vegas. "And people are fascinated when a sign moves."

Sign Systems is a relative newcomer to the sign business, having hung out their shingle in 1981. Founded by four sign-biz veterans, the company now employs seventy people. Among them are the craftsmen, technicians, and designers whose business it is to bring new marquees to life.

They even have a micro-sharp competitive edge now. Sign Systems installed the first computer-controlled sign system on the strip—and the whole town's talking. Says Moultray: "Traveling message centers are the way to go. It's the next big revolution in the sign business."

Some of Sign Systems's other handiwork has included face lifts for the California Club hotel and casino and the Westward Ho motel and casino, plus subsidiary sign work for the Flamingo Hilton.

Surrounded by scrub brush, the company is located just outside of town in a brand-new building that's about the size of an airplane the suspect has been spotted in the neighborhood. There is a risk in driving a rental car to their door—it's nearly the same make and model Ruth had been driving.

Al picks up his guest at a nearby supermarket. He takes a zigzag route to the house that would have ditched a native. Then he makes a discreet slowdown to get the license number of a car in the garage of a house that's being watched.

He only gets three of six digits. That's the breaks.

Al turns onto a dirt road. In the middle of an animated story he abruptly stops talking, eyes glued to the rearview mirror. Another car has also turned onto the dirt road.

Eventually it turns off again. False alarm.

Despite all of this suspenseful chicanery, Al Kaplan, director of Attorneys' Investigative Consultants, claims the investigative business is "not like what you see in the movies."

Sure, Al.

Some of the cases that A.I.C. has handled read like plots for a TV detective series:

A man misplaces $20,000 in gambling chips and asks the Kaplans to help him recover them—for a percentage. The hotel in this case is uncooperative. Al says their attitude is "No tickee—no shirtee."

A man visiting Vegas has an attack of viral senility. His wife calls the Kaplans, frantic. They find him, Al says, "wandering around Las Vegas like a child."

An out-of-state millionaire wants the agency to watch his girlfriend while she's in town. "Strangely enough, most of the girlfriends we watch turn out to be attached to some out-of-state millionaire," says Ruth. The client is constantly interrupting the surveillance with anxious phone calls.

The Wrong Man. A payroll forgery involving a $400,000 check is discovered by one of the Vegas casinos. The culprit is disguised as another man. The other man is tailed until the Kaplans realize he couldn't possibly be the suspect. "He wasn't acting guilty enough," jokes Al.

All that's missing is gunplay in act four and the pop of a cork at the end. But real life is rarely wrapped up that neatly.

Constantly moving from case to case, the Kaplans work out of three locations: their home, their westside office, and one of their radio-equipped cars. Al carries a walkie-talkie with him to keep on top of the daily field work.

Their technical center of operations offers a peek into the fascinating world of information gathering, both old school and new.

A three-by-six-foot operational map of Las Vegas hangs on the wall of the office. It's dotted and striped with colored tape representing locations of current cases. Also on display in the office are medals and certificates honoring Al for his various military exploits.

Some books on the shelf: a law dictionary, a book on gambling, a national directory of investigators, a technical journal of arson investigation, a mixed batch of phone books, an old volume titled "How to Remember Names and Faces."

A pair of binoculars, a tape recorder, and—surprise—a magnifying glass lie on top of a file cabinet. A 1955 IBM Executive sits covered in the corner. "According to the company, it's the second oldest IBM in Nevada," states Ruth. "They sent out an old-timer to fix it; none of the new people knew how."

Triple Indemnity. On a desk of its own, nudged into a crowded corner, sits a cool beige trio: an IBM pc, Starwriter printer, and a Tecmar ten megabyte hard disk drive. They're part of the new school of investigation.

The old days when a slinky blonde would walk into a detective's office and spill the beans are over. "Nobody likes to come into the office," says Al. Selective about who they see, sometimes they let a mail drop do the introductions. Most of their clients prefer to contact them from pay phones.

"They think it's fun," says Ruth. "A lot of them like to meet us in a hotel room or a bar." It seems old schools die hard.

"People who call also don't like to have questions asked. It's the kiss of death sometimes to ask too many," proclaims Al. "But we've

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hangar. This is where sign fantasies are created, from thumbnail sketches to actual construction.

A sign is born as a series of sketches between artist and client. Then watercolor renderings are made. These are turned into meticulous blueprints that are sent out for cost estimating.

If the price is right, the sign goes into production. Sometimes an actual-sized chunk of the sign is built first to show the client the play of the lights, an important factor in these Las Vegas extravaganzas, as you might imagine.

A sign comes into physical existence when the blueprints are sent to the projection room and turned into patterns to be cut in sheet metal. Then the welding and wiring is done.

As soon as all the components of the sign are joined, it is hauled by crane or trailer into the paint room and given its coats.

While all this is going on, plexiglass wizards are cutting the marquee. According to Moultray, Sign Systems is the only company in town that still does inlaid plexiglass work. "It really takes a craftsman's attention to detail. They're working in eighths and sixteenths of an inch."

When a sign is finished, it is hauled by truck to the site and hung by crane. Any previous sign work at the site is hauled back to the plant and tossed in the boneyard out back.

Only half the job is finished when a sign is lit. Light bulbs and letters are replaced regularly. Signs are repainted before they get dull and washed before they get dirty.

"No other town in the world can offer what Las Vegas can when it comes to limitless opportunities in creating signs," Moultray explains. "Only the Ginza in Japan comes close." The town itself is a study in information vending. It seems the most popular casinos aren't the ones with the best signs (everybody has their favorites)—they're the ones with the most signs.

Competition is keen in the million-dollar marquee business. And the industry is not without its internal rumblings. At the time of this visit, a one-day strike had just been settled.

Sign Systems is on top of their trade. "We can give a customer total sign service, from the hand-painted sign that says 'men's room' to the neon in the lobby, to the plexiglass lettering on the marquee," notes Moultray.

Sign Systems is a little bit proud of their new electronic display sign for the Fashion Show Mall. It's not what visitors expect to see on Glitter Gluch; it's low-key by comparison. It doesn't even advertise a casino. It touts a pick-of-the-crop shopping mall anchored by the likes of Bullock's and Neiman-Marcus.

The sign's design and construction are the work of Sign Systems, but the message system itself was subcontracted out to Kallego Electronic Display Systems of Grand Island, Nebraska. The ten by twenty-five foot display area runs on an IBM pc with a 256K base and double-sided disks. It has 6,000 lamps in play.

"The IBM can address 20,000 lamps and handle a lot of graphics and animation," says operations manager Gary Rosacker of Kallego. "Additional disks make the system infinite. We chose the IBM because it has more memory for the graphics."

Some of their signs are run on their own ZMS 80 microprocessor, specifically designed for smaller jobs. Kallego engineer Norris Lauer is currently programming a splashier set of messages for the Las Vegas location.

Meanwhile, Ken Moultray and his signmasters already have another hotel/casino sign on the boards that features the new electronic marquee. They know they have a hit on their hands and want to trade up to the 20,000-lamp display while the idea's still hot. ▲

got to know what we're getting into. We get a lot of hokey calls, too. We've taken a couple of cases where we should have looked before we leaped."

A crew of about twenty operatives carries credentials while working for the Kaplans. Part-timers, they're usually on call for surveillance or legwork, such as checking police records, calling around, or scouring the library. Some are specialists hired for their particular areas of expertise, like being a dancer, or an ex-cop, or an artist.

Ruth shows us an A.I.C. file on a check forger who was nailed by their artist's rendering, based only on one man's description. The resemblance between photo and drawing is uncanny. "We're really proud of that one," she says.

Some of the on-call A.I.C. agents are just good "types" who can be used to flesh out a pretext—known to all fans of criminal investigation as a sting.

The Lady from Shanghai. These professional charades can vary from having Ruth pose as a new neighbor in an elevator with a mike in her groceries to having her check into one of the hotels posing as an oil millionairess with her boyfriend, Al, at her side.

"A suitable pretext, as we call it," Al explains, "is what we use to secure information we can't get any other way." Pretexts involve the use of schemes, tricks, and disguises—whatever gets the facts, ma'am, or gets a suspect's tongue rolling.

In Las Vegas everybody's in show business. Both Al and Ruth often change clothes two or three times a day, in and out of wigs, jackets, mustaches, and make-up for whatever a case may require. They have even recruited their two daughters into a few pretexts. "One of them was once wearing one of my wigs," says Al, "and one of our own agents didn't recognize her."

On another case, "Al just finished playing a garbage man. He picked up a suspect's trash in a rental van," explains Ruth. They rummaged through it—nothing they could use. "It turned out to be a garbage can full of chicken bones and McDonald's wrappings. What a smell!"

And they say you can't sting a stinger.

The investigative business seems to run in Al Kaplan's blood. He was a special agent and subsequently was promoted to chief of criminal operations for the Air Force Office of Special Investigations, overseeing the criminal investigations of more than one thousand special agents. He retired from the khaki life in 1973.

Then he put in five years as senior investigator for Howard Hughes's Summa Corporation. Al got his first publicity investigating the Hughes will. He still carries a copy of key number 47 in his wallet. The famous key, found among Hughes's possessions when he died, was figured to lead to money or secrets. It had Al chasing a hunch from a women's prison in Illinois to a fur vault in Beverly Hills, California. No money, no secrets.

Ruth's background prepared her for the mix of theater and skullduggery she now performs. She met Al while singing and playing drums in a dance band. She's also modeled, done musical comedy, hosted her own television show, and earned a master's degree in music. All this while rambling from Texas to California to Germany to Las Vegas.

The Kaplans have been living in Las Vegas for the last nine years and have been in the investigative business for the last four. They've only had their pc for four months, and Al can only type on it with two fingers—but don't let that fool you.

Al knew exactly what he needed a computer for: out-of-pocket expense billing, whipping up reports, and doing some fancy footwork in the way of indexing. He shopped around until he found a machine that fit the description.

The Cheaper the Crook, the Gaudier the Patter. Al suspected an Apple III could do the job, but the salespeople said he'd need 150 megabytes to do it. Convinced the store didn't know programs, he went away unsold. He also spent some time looking at minis and the TRS-80. Nothing clicked.

"*WordStar* sold us on the pc." he says. "It did two things we wanted done." The program's find feature sealed the pc's victory.

"A large part of deduction is looking for similarities—coincidences—asking yourself, 'Where have I seen this before?' That's a real job when you consider the voluminous files we build up.

"The heart of our operation is searching indexes. We keep file cards with names on them and mark all the reports with red pen." Some of this hard copy is stacked up by the pc. "All this has to be collated or you lose what you have."

The A.I.C. computerized index is a repository of facts, coded by case. "I go through a dupe of a report and chop it up. I only save proper names, occupations, maybe unusual car descriptions, and license plate numbers. All the potentially interesting facts.

"Related things happen from one case to another. What seems routine at first might net us something later. With the IBM, all we need is an identifier and we can run it—maybe just a first name, or part of a license number.

"When we're watching a house we'll take down plates, say, every night for a week—just to see what we can pick up."

He points to the plate number of a man who just popped up on a current case. Running it through the machine shows that the same plate number figured in another case three months earlier.

Coincidence? Or is the man a link between the two cases? "We aren't sure," says Ruth. "We're checking on it right now."

Touch of Evil. Reports of surveillances for clients are also handled by *WordStar*. These reports are what probably inspired the hard-boiled school of detective fiction. They're brisk, factual, to the point—and sometimes just plain dull.

"Even if a surveillance doesn't really net anything, clients like to have a play-by-play of what went down. They like to know they're getting their money's worth," explains Al.

Operatives enter their daily notes in a dumping-ground file

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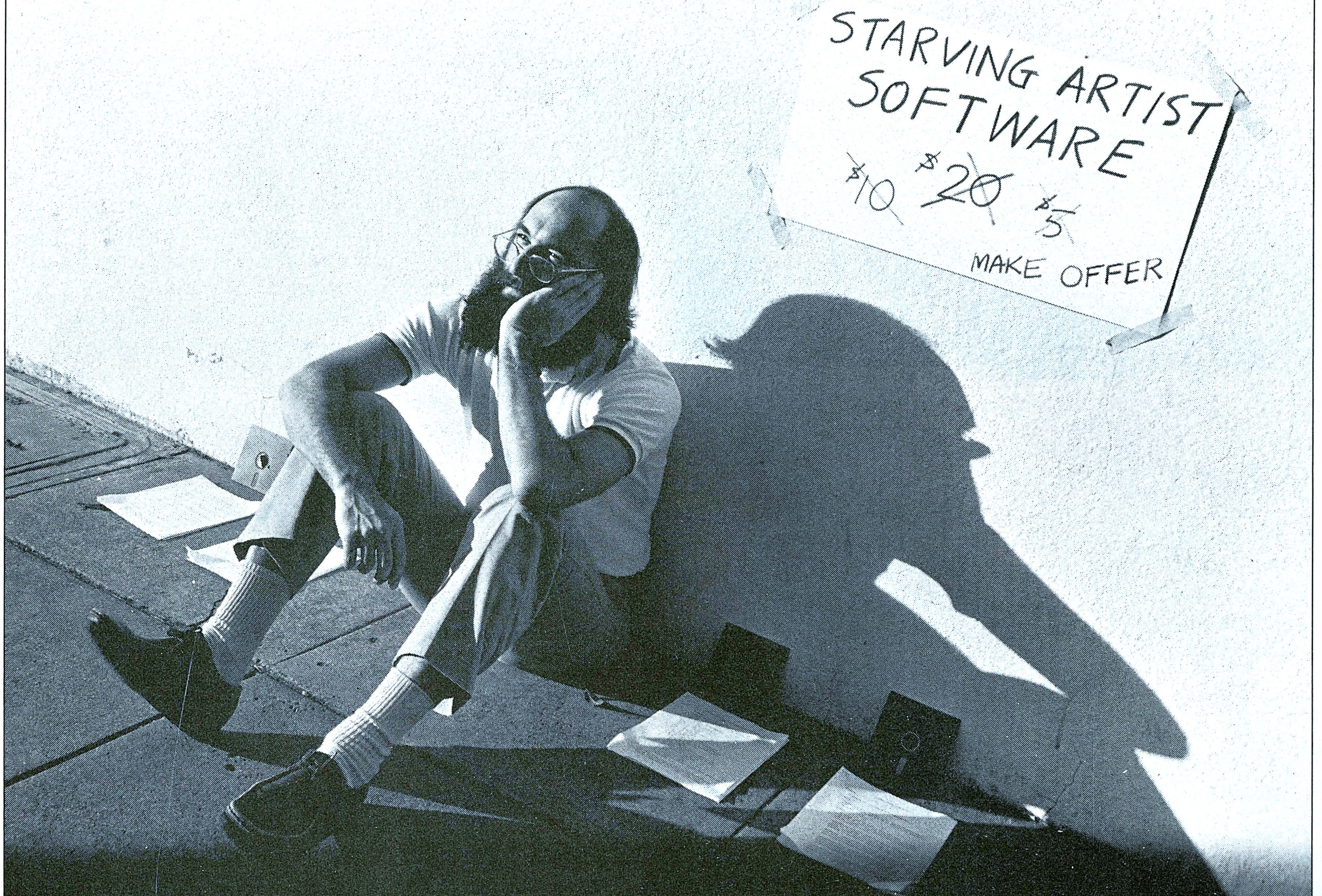

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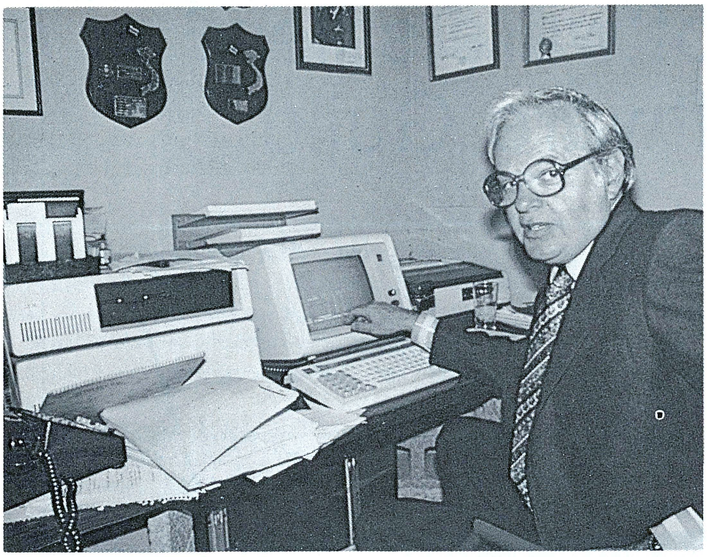

Agent pc's assignment: the collating and dovetailing of random facts into revealing patterns of information. Al Kaplan has armed his protege with WordStar *for the purpose.*

called *The Diary*. "We're going to have to get another terminal in here soon," says Al. "We all fight over this one now. You have to stand in line sometimes."

Al scrolls through *The Diary* and occasionally creates leads, or work to be done. It may be "pick up ///" (their symbol for subject) for surveillance, or a caution to "avoid getting burned" if a suspect seems "tail wary."

Client billing continues to be an uphill battle for the Kaplans—it's detailed, messy work. Phone calls, transportation, confidential sources, mileage, agents' time, slot money for an investigative cover. A customized *SuperCalc* helps invoice all this now, although some clients—particularly in domestic cases—don't want invoices laying around.

SuperCalc also keeps a daily status record of up to 254 cases—some active, some awaiting final payment, and others closed (no further action required).

Theft of their valuable confidential files by a rival agency is not Al and Ruth's major worry—and they trust their staff. They've taken all reasonable precautions to protect themselves legally. What worries Al is the common cat burglar after the hardware itself, unaware of its compromising contents.

"We keep a back-up disk in a safe-deposit box downtown," he explains. He also had installed one of the most sophisticated, state-of-the-art encryption devices he could find.

"I originally wanted to put in a hand grenade," he jokes. "Or booby trap the disk to make the files reformat themselves if they were tampered with." But that proved too dangerous—any accidental handling could crash it all.

Beat the Devil. The encryption protection he settled for is ingenious. It's also "not for publication," says Al, making the point by flashing his sharp brown eyes.

That's what keeps the private in private investigation, whether it's real life or in the movies. It's easy to see why so many satisfied clients have said, "I'd hate to have those two after me." ▲

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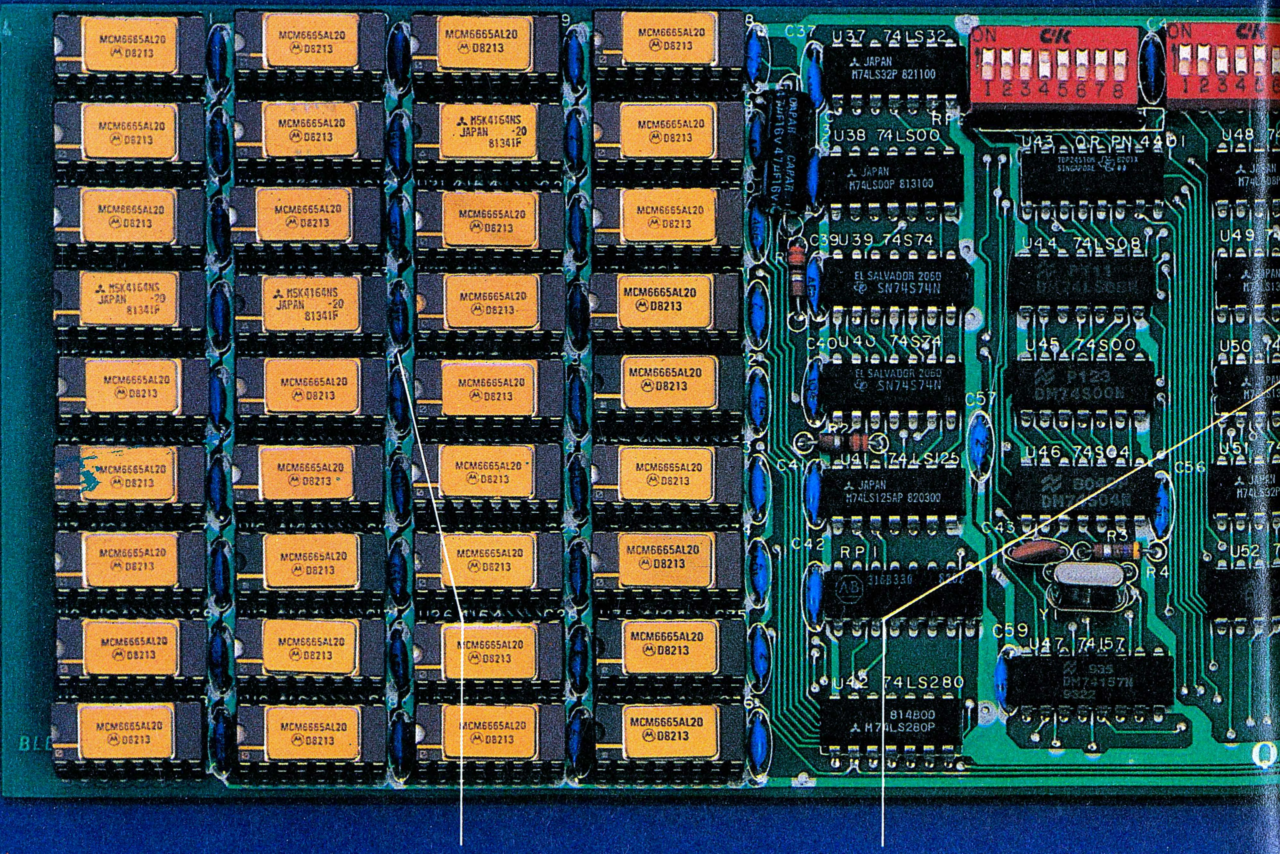

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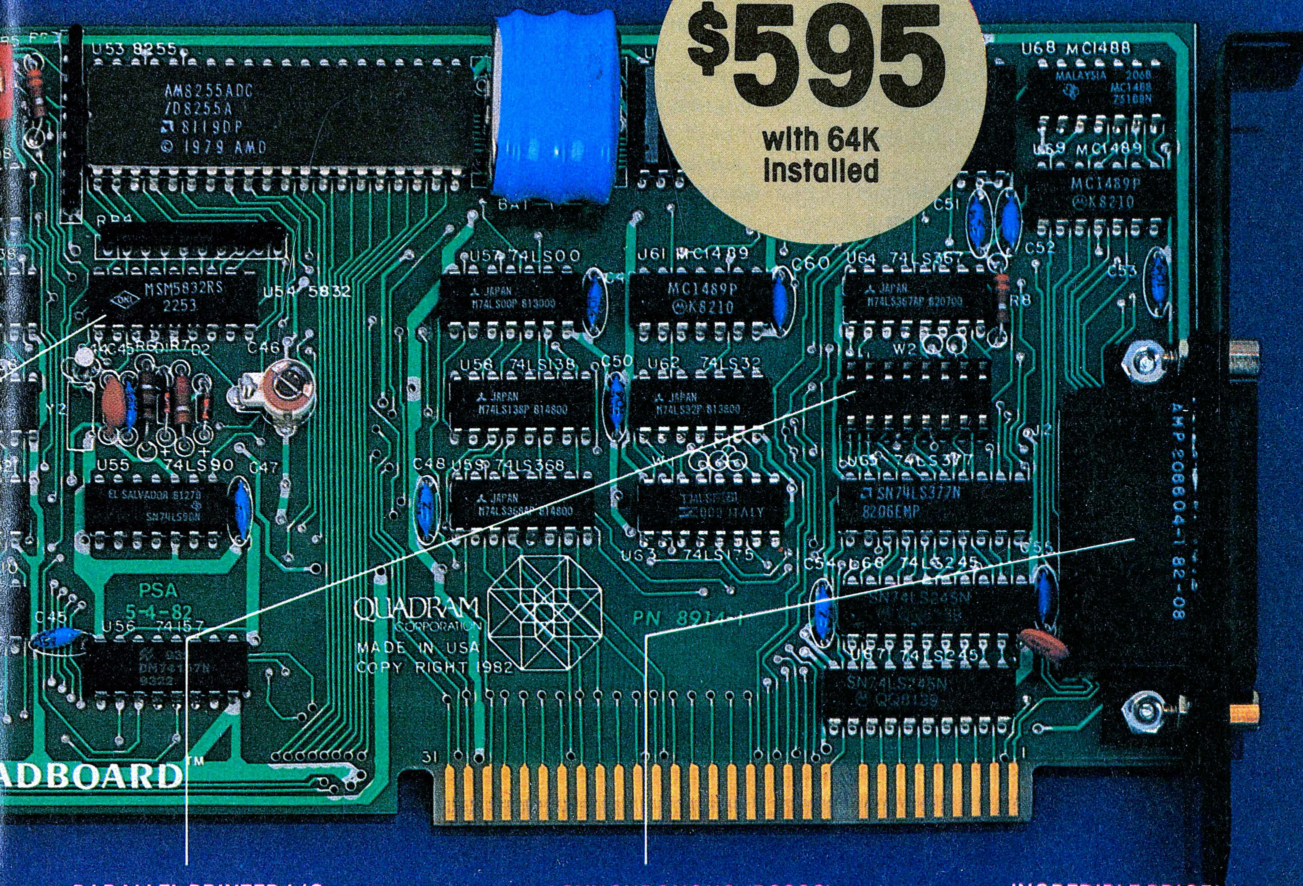
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ASYNCHRONOUS (RS232) COMMUNICATION ADAPTER.
Using the same chip as that on the IBM ASYNC board, the device is software programmable for baud rate, character, stop, and parity bits. A male DB25 connector located on the back connector is identical to that on the IBM Async Adapter. The adapter is used for connecting modems, printers (many letter quality printers require RS232), and other serial devices. Switches allow the port to be configured as COM1 or COM2 and the board fully supports IBM Communications Software.

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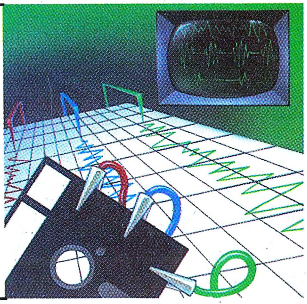

Unless otherwise indicated, software reviewed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

WordStar 3.2. Odds are that a year after you've started using *WordStar*, you'll still be discovering things it can do. For this is a full-service word processor, one whose functions and capabilities are so numerous that entire books have been devoted to their explanation.

For starters, *WordStar* will provide microjustification (proportional spacing), superscripts, and subscripts—to printers that have those capabilities. It has its own, very respectable, hyphenation logic built in, allowing you to justify documents without leaving enormous holes between words. It's a what-you-see-is-what-you-get word processor, but its output isn't limited to the width of your eighty-column display. If you want to use the full width of your 132-column printer, *WordStar* will go into a horizontal scrolling mode so you can still see each line—as you write it—the way it will appear at print time.

Tab stops may be either normal or *decimal*. The decimal stops automatically align numbers as you would want them for a financial report, with hundreds lining up under hundreds, tens under tens, decimal points under decimal points, and so on. The search and replace facility includes options for including wild card characters in a search field, for replacing a given number of times, for searching to the nth appearance of the target field, for searching for carriage returns, and even for seeking anything that *doesn't* match a given character.

There's an embarrassment of formatting and display options. For example, you can select from four levels of on-screen help—all the way from no help at all to about half a screen's worth of messages plus context-relevant information when you're in the middle of a command. Page breaks can be displayed on screen or not, as you choose; likewise tab stops and all four margins. Justification and word wrap are both optional, of course, and you can set line spacing to anything from one to nine. Naturally any of these parameters can take on different settings at different points within your document. Headers and footers are available; page numbers default to bottom center but can be included within a header or footer (which may alternate flush left and flush right, if you choose) and can be suppressed either temporarily or throughout a document. Immediate or conditional page breaks can also be commanded from any point within your text; the conditional breaks allow you to keep a chunk of material—like a chart—all on the same page, even if you subsequently change your page-length parameter or your top or bottom margins.

All the usual editing tools are here, as well: insert and strike-over modes; character, word, and line delete; delete from cursor to end of line (or to beginning of line), and so on. The block options permit you to rearrange—or copy—larger segments of text and to create subfiles on disk or incorporate disk files into a document in memory. There's also a columnar block option that lets you manipulate a rectangle of text that doesn't go the full width of the screen.

Even if you never use more than a fifth of *WordStar*'s editing, formatting, or printer-control facilities, you'll appreciate the program's hospitality. Take file-handling as an example.

When you begin work on a document with *WordStar*, you specify a file name. If it happens that you're going back into a file already on disk, the program first duplicates that file and gives it the extension .bak. Then it loads your document into memory. So if you save changes to disk and later decide you've made a colossal blunder, you still have the most recent previous version of your work in a backup file.

As you write or edit, when your file gets to a certain size, *WordStar* will send it off to a working file on disk (with the extension .$$$) so you don't have to worry about exceeding the capacity of your RAM. If somebody throws a circuit breaker while you're working, you may find most of your words safely saved, even if you've neglected to save manually. Neither automatic nor manual saves need slow the flight of your fingers, incidentally, because the program provides an ample buffer—enough to capture a couple of lines of text at typical page widths.

If you have more than 64K of memory, you can even send a document to the printer and continue to type.

The price for all this power, of course, is a certain complexity. *WordStar* won't be mastered in an hour. But the job isn't as fearsome as you might expect—books and classes on the subject notwithstanding. You get three pieces of documentation from MicroPro International: an exhaustive reference manual that covers everything in detail and even includes the assembly language source listing for two areas of the program (allowing the knowledgeable to customize), a three-panel command summary on card stock, and a tutorial. The tutorial comes in the form of a self-contained easel, so it stands up next to your keyboard.

Then there's all that on-screen help. By entering the right couple of keystrokes you can wander into almost any byway of the program's command structure and get a summary of available options.

And the command structure itself is logically, if not mnemonically, organized. Almost all the commands consist of a control-character prefix plus a second character. For the second character you can either leave your little finger on the control key or not; the program recognizes the command either way.

There are five large groups of commands, prefixed by control-O, control-P, control-J, control-Q, and control-K. The first two of these groups affect screen and printer output respectively. Control-J leads you into the various help screens, while control-Q (for quick) sends your cursor in various directions—to the top or bottom of the document or the present screen, to a previously defined *marker* (of which you may have ten at any time), or to the place from which you issued the last previous command. Control-Q also prefixes the search and replace functions. The last group, the control-K commands, are for anything involving blocks of text—including saves to disk as well as block rearrangement. There are also a few single-stroke commands, and this version of *WordStar* has the advantage over its CP/M-80 predecessors of being able to use the pc's function keys and cursor pad.

There's more—but perhaps we've said enough. What *won't* the program do?

Well, it won't count words. But if you hit control-OP it will tell you the number of bytes in your file, from the beginning of the file to your current cursor position. Hitting the same command a second time returns you to the default display, which consists of page and line numbers.

It doesn't permit any easy permanent alteration of defaults. If you don't like justified printing or single spacing, for example, or if you prefer normally to be in a strikeover rather than an insert mode, you need to issue some commands every time you run *WordStar*; such a requirement seems a little incommodious in software of this class. But, of course, if you know how to get into that assembly listing. . . .

The program has a rudimentary hanging indent or outline facility. Once you've started a paragraph you can temporarily alter the left margin so that subsequent lines within the paragraph turn over onto a selected point of indentation. But if you want to repeat this pattern in the next paragraph, you have to reenter the command. It would be nice instead to have a hanging indent command that remained effective until killed.

Finally, there may be a few quirks of PC-DOS that are not adequately dealt with in the present *WordStar*. Example: if you have sixty-four files on disk, the program *will* allow you to create a new document; when you try to save, you'll get a *fatal* "file directory full" error and lose your work. Similarly, you can specify a file name that includes disallowed characters, like slashes; attempting to save such a file brings you down with no recourse but to start over.

Even a Rolls-Royce has to be driven carefully. **CS**

WordStar, MicroPro International (1299 Fourth Street, San Rafael, CA 94901; 415-457-8990). $495. CP/M-86 version, which requires 128K, also $495.

Call to Arms. By Mike Falkner. Ever played *Risk*? It is a simple, family-style board game. Players control brightly colored little heaps of tokens representing armies. There is combat, with much rolling of dice, until one player controls the whole world. Most of the fun is in the continual blustering and back stabbing. ("Eat death, Russky!" "The free people of Iceland will never bow to a foreign oppressor." "You can take Australia if you want, but the Yankees will wipe us both out next turn.") *Call to Arms* is a computer game with the same spirit. In many ways it is a more realistic and exciting game.

Call to Arms can accommodate any number of players from zero to four. That's right, zero. You have the option to fill any of the four player positions with dummy players controlled by the computer. If you fill all four places, the machine will contentedly play itself for an hour or so, flashing conquests and casualties to the screen.

There is a choice of two maps—Europe in 1942 or Scotland in 1750. Actually, there was no war in Scotland in 1750, but some people will prefer playing on a map with names like Fife and Dunbarton instead of Spain and Morocco. The mechanics of play are identical. Having chosen a map, you decide how you want your forces positioned. You can choose either contiguous territories or a random distribution. You also set the number of armies initially in each country (a number from two to nine).

Each country has a "defense factor" that also contributes to the number of reinforcements available each turn. For example, if you control England at the beginning of a turn, you get one army as reinforcement. Holland and Belgium are worth half an army each. If you control all four, you get two armies that turn. Naturally you can't receive a fraction of an army as a reinforcement, but fractions will carry over and count to your total next turn.

Having distributed reinforcements, you have the pleasure of attacking your fellow players and annihilating their armies. You can make any number of attacks, but combat is biased in favor of the defender, so you may settle for a few carefully chosen assaults rather than a broad-front offensive. Once you have ravaged as many countries as seems practical, you have the chance to *reduce* your forces, pulling them from any place that looks safe. (These forces are added to your reinforcement pool next turn.) You also have the opportunity to save the game.

All this bloodthirsty work seems to flow smoothly and logically. The graphics are crisp, taking good advantage of the required color/graphics adapter. The dummy players take their turns quickly and effectively. (They would probably win more often if they did not spend so much time fighting each other.) Human obstinacy and independence are simulated by a "resistance factor" in each country. If you leave too small a garrison in a conquered country, the populace will overthrow your despotic regime and reinstate the former government. Play can get suspenseful as a player tries to consolidate a hastily acquired empire, two allies contemplate betraying each other, or one fellow tries to hold his own against the world.

Unfortunately, the documentation is rather terse and cryptic. There are no maps in the rule book. It may take you a while to figure out whether you can attack from Libya to Italy, or to locate a place like Kirkcudbright (not obvious to most of us).

Call to Arms is probably the finest strategy game written for the Personal Computer. Praise the Lord and pass the keyboard. **fj**

Call to Arms, by Mike Falkner, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $29.95.

Data Capture/pc. By David Hughes and George McClelland. Beyond simple communications with mainframes and microcomputers, communications programs should have the ability to upload

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and download files easily and the ability to adapt easily to the requirements of different remote computer systems. Additional useful, but not essential, features include automatic dialing and telephone number storage for intelligent modems, user assignment of function or alternate keys, and printer control. *Data Capture/pc* is a sophisticated and easy-to-use communications package that has all these capacities and more.

When *Data Capture/pc* is used, all incoming and most outgoing data are passed to a user-accessible capture buffer in addition to appearing on the screen. If the buffer overflows, the program automatically opens an overflow file on disk and continues operation with no loss of data. The buffer, or portions of it, may be saved or printed at any time. Limited editing and review of buffered text may be performed without leaving the program. The capture buffer may be bypassed if desired, and all downloading may be routed directly to a file. Upload files may be called and sent on user command.

Data Capture/pc is beautifully designed for both novice and experienced user. Program operation can be fully menu driven. After engaging the main menu, the user is allowed to invoke several operations on the capture buffer with single keystrokes. These operations are text deletion, insertion, listing, transmitting, printing, and exiting the program.

Three secondary menus are accessible from the main menu: files, options, and toggles. Operations that concern files include directories of either drive, erasing, listing, merging into the capture buffer, printing, transmitting, opening, closing, and writing to disk. Control of serial communication parameters is available from the options menu with no need for any understanding of programming. Transmission speed may be set to 110, 300, 600, 1,200, and 2,400 baud. Because there is little standardization of the use of control characters in communications systems, it is important that a communications program allow certain characters to be ignored. This is nicely accomplished in *Data Capture/pc* with a device called a control character filter table. The user simply specifies by letter which control characters are to be ignored. Modem parameters (data bits, stop bits, and parity) are also easily controlled. Other options allow the user to save or load a file that contains a set of user defined defaults. Thus, if you use several different remote computers, each one having different communication requirements, you can set up for any of them by simply loading a file that contains the appropriate parameters and defaults.

The remaining items in the options menu allow you to assign the function keys. This feature is useful for saving the telephone numbers of different computer systems, automatic dialing and hanging up on the Hayes modem, log on and log off sequences, frequently used commands, and so on.

The toggle menu options control the printer, buffer status, duplex, logged drive, and on-line/off-line status. The remaining toggles control some parameters useful for tailoring transmission to the peculiarities of the remote system with which you are communicating.

As good as menu-driven operation is, few users will remain in this mode for long. It may be bypassed completely by one and two character alternate key sequences. For example, files may be written at any point by using Alt-FW, the printer may be toggled with Alt-TP, and so on. This is an outstanding feature of the program, and experienced users will find themselves consulting the menus only for memory loss (theirs, not the computer's).

Program operation was tested on a 128K system at 300 baud for communication with the Source, CompuServe, a DEC PDP 11/70 running under RSTS/E, a CDC CYBER 174, and a CDC CYBER 730. Both CDC machines were operating under NOS. Uploads and downloads were performed without problems of any kind. Automatic opening of the overflow files when the buffer overflowed worked exactly as specified in the manual. General communication was just as trouble-free. Even the character deletion problem that has made IBM's offering in this area worthless was handled without effort. Character display was particularly smooth as compared to some other communications programs.

Documentation is superb. Not only does everything work as specified in the manual, but the manual itself could serve as a model for other software producers. The English is clear, the organization is easy to understand, and the manual is well indexed. First-time users who try the tutorial will find it moves along at the right pace and things work the first time with few if any false starts.

There are a few quirks and limitations in the program. *Data Capture/pc* locks you into the use of Com1 as your communications port. This makes it incompatible with other programs (like *WordStar* with a serial printer) that also force you to use Com1. Uploaded files apparently bypass the capture buffer. Thus, if you use the capture buffer to log all operations, you will not see the text of files you have uploaded. Exit from the program does not return the Hayes modem to default status. This means that incoming callers can be greeted with nothing but a carrier under some configurations of the modem unless you physically turn it off.

Overall, *Data Capture/pc* is an excellent, thoroughly professional communications program. Unfortunately, it is *not* a good value for the money. This is a fine product in a field of fine products. Other communications programs of equal quality and ease of use are available at less than one-fourth the cost of *Data Capture/pc*. Though this program is worthy of wide distribution and use, it is difficult to see how *Data Capture/pc* will attain the following it deserves unless Southeastern Software adjusts its price. **bo**

Data Capture/pc, by David Hughes and George McClelland, Southeastern Software (7743 Briarwood Drive, New Orleans, LA 70128; 504-246-7937). $120.

Zork III. By Marc Blank and Dave Liebling. The Infocom team improves with every outing—and they started at the top. *Zork III* is filled with well-written descriptions of imaginatively delightful and curious places. The grandeur of the ancient high-arched aqueduct system, shining in stolen sunlight; the damp, swirling mists of the Land of Shadow; the brilliance of the pit of fire, two hundred feet in diameter, its depths and heights lost in turbulent smoke and sunlike flame—all these are far more graphic than any depiction yet achieved by an adventure with graphics.

Realize that the *Zork*s are essentially a trilogy chronicling the history of a great lost empire that once flourished underground. It was a realm that reached some level of achievement before its demise, having created entire aqueduct systems and hollowed-out mountains. It had great banks and businesses and a royal government, complete with crown jewels. It also had a Royal Puzzle.

Most of these achievements exist only in ruins now, and much has been lost completely. Grues menace the remains—gruesome predecessors of gruds and far more discreet in that they never show themselves. For many years the empire has been little more than a testing ground for adventurers and a home for a few seldom-glimpsed eremites.

And, of course, a prime mover. No? Yes, indeed. Someone had to give Blank and Liebling their inspiration, fill them in on the story. If you are clever enough, and good enough, and sensitive enough, you may meet this being in *Zork III*.

When you begin *Zork III*, you do not know your goal. That's one of the problems you must solve. Careful observation and constant relating of information will determine how well you'll solve this one.

What you will know is that the total score you are after is seven. That's all.

Two things are most unusual about the scoring system in *Zork III*. Each point is given for having behaved properly in a situation or toward a puzzle; it is not given for solving the puzzle or for knowing what you've done. You can earn all the points and not know how you did it. The true lover of logic and adventure will not be satisfied until those points are understood; all the evidence is there.

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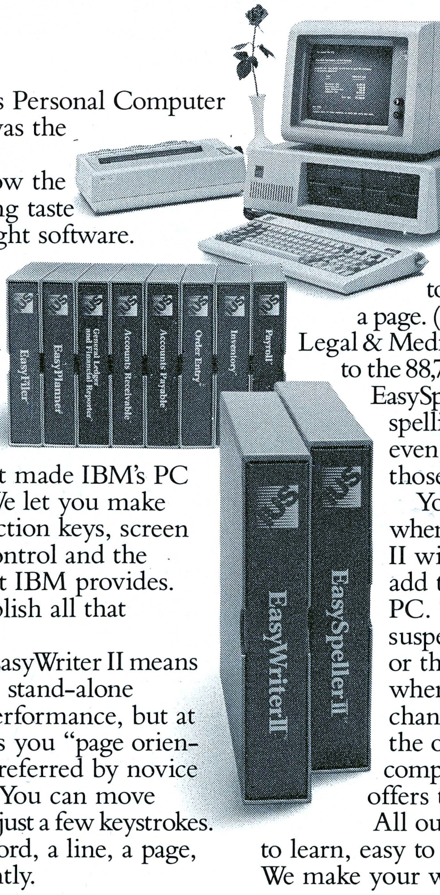

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And, indeed, when you've gained all the points, you aren't through. You still have to prove yourself with one of the hardest, yet most clearly logical, puzzles in adventuredom.

Zork III, like all Infocom adventures, is not a word game. The vocabulary is extensive for an adventure, and if you use a word Zork doesn't know, it tells you which word is the problem. Niggling over words is not the point; logical problem solving is. And you need not be afraid to use erudite words; if the word fits the situation, Zork probably knows it.

Although plot is not its forte, *Zork III* has a theme, morals, and meaning. It's a masterpiece of logic that demands that you think. No adventurer—or game-enjoying thinker—should be without it. mct

Zork III, by Marc Blank and Dave Liebling, Infocom (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). $39.95.

SuperCref. By Michael Condra. *SuperCref* is a cross-referencing program for Basic, BasicA, and compiler Basic languages on the IBM pc. A cross-referencing program checks the source code of a program and lists all occurrences of language symbols and their references in that program. Thus a cross-referencing program is a very valuable tool for programmers.

In *SuperCref*, four different types of words in a program are listed. Basic symbols are listed with all line numbers of where they occur. The same is true of all other program-defined symbols (like variable and function names). Subroutines and miscellaneous line referencing statements (like *goto* and *resume*) are listed with the line numbers they reference. All of these referencing functions can be enabled or disabled according to the programmer's need. A source listing of the program can also be produced, with each symbol that has been cross-referenced displayed in bold type.

There are three different ways to output data with *SuperCref*. One can display to the screen only (both monochrome and color graphics are supported). The program makes use of the high-intensity white screen display to show cross-referenced statements. One can also send the report to either a serial or a parallel printer. For printers that have a double strike or emphasized print capability, the program allows modifications to enable these functions. This allows hard copy to emphasize cross-referenced symbols. You can also dump your cross-referenced file to disk. In all cases, source listings and cross-referenced listings are output to the screen. Each section of references has its own header; the title header makes use of the date and time function. The printout is nicely formatted and very readable.

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One handy feature of *SuperCref* is that it can easily be modified by the user. So if there are any language additions that IBM makes in the years to come, you can simply add those commands to *Supercref*'s data table without having to send your disk back for modification.

SuperCref will not handle all references made in a program. Implied *gotos* and some uses of the *erl* statement are bypassed, as well as any extended logical line used in compiler Basic.

Overall, the program is fast and efficient. It takes up very little space on a disk, allowing you to fit it onto a programming work disk with no problem. It is also easy to use, keeping keystrokes to a minimum and displaying understandable command lines. Documentation is clear and to the point. mz

SuperCref, by Michael Condra, The Write Ring (5050 Garford, Suite 160, Long Beach, CA 90815; 213-498-6496). $25.

Word/PC. By Clifford Pulis. Word processing programs for the pc appear to be of two types. First there are the powerful packages capable of many functions used by professional writers or active businesses. These are rarely required by the home user or the office that has only routine correspondence. The second group of word processors are designed for ease of use and economy. Users of these should be able to sit down and quickly feel comfortable with the programs, and the products should respond reliably to needs for basic text entry and editing.

Word/PC is of the latter type. What's unique about it is that add-on modules are available (or will be shortly) that allow you to make the basic program more powerful, as your needs dictate. The concept is a good one: You pay only for what you need now.

Word/PC is page oriented. You work with one page at a time, viewing the page on screens that hold twenty-two lines (a third of a page) apiece. You may use any page format that utilizes a maximum of eighty characters per line, sixty-six lines per page. The maximum usable data file is twenty-nine pages on a previously blank disk or forty pages per file with a hard disk.

A main menu prompts you for a new or old file and takes you to a designated page. Entry of text is relatively simple, and a help menu is only a keystroke away. Cursor movements are easily performed, using the number keypad arrows. Word wrap is available. The edit mode is straightforward, offering line insertion and deletion, centering of lines, simple block moves, the setting of line spacing, and some other functions as well. A word counting routine is built in for each page.

A method is provided for determining the location of columns on the screen. This involves the display of a ruler at the bottom of the screen. In combination with the line number displayed, the exact numerical position of the cursor on the current page can be determined.

The documentation is not easy to follow. The program is written in Basic and, in its uncompiled form, runs rather slowly. A compiled version is available on the same disk, but this version requires a 96K system.

Word/PC is a simple, economical, straightforward piece of software that incorporates the features necessary to do routine word processing and allows expansion to more powerful capabilities at extra cost. ss

Word/PC, by Clifford Pulis, Computer Software Technology (9818 West Belleview Avenue, Box 5049, Littleton, CO 80123; 303-794-0858). $89.95. ▲

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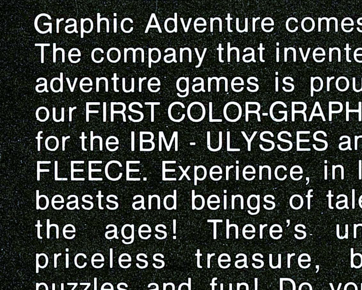
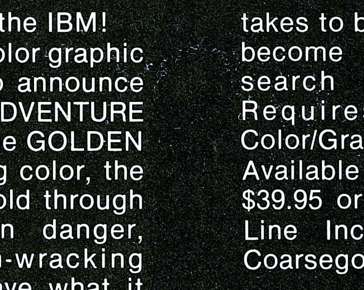


```
behind you.  Suddenly King Neptune
rises from the ocean depths.
You are in the ocean.
Enter command: _
```



```
There is a dragon here.  I think he
means business.
You are in an underground
passageway.  Paths lead north.
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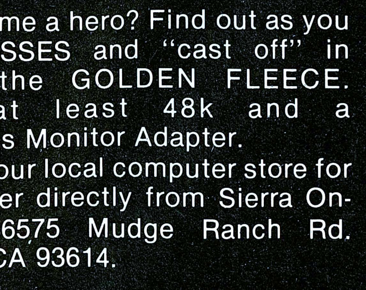

```
Your crew stays behind.
There is a loud rumble; and the
cliff closes forever.
You are in a small valley
```

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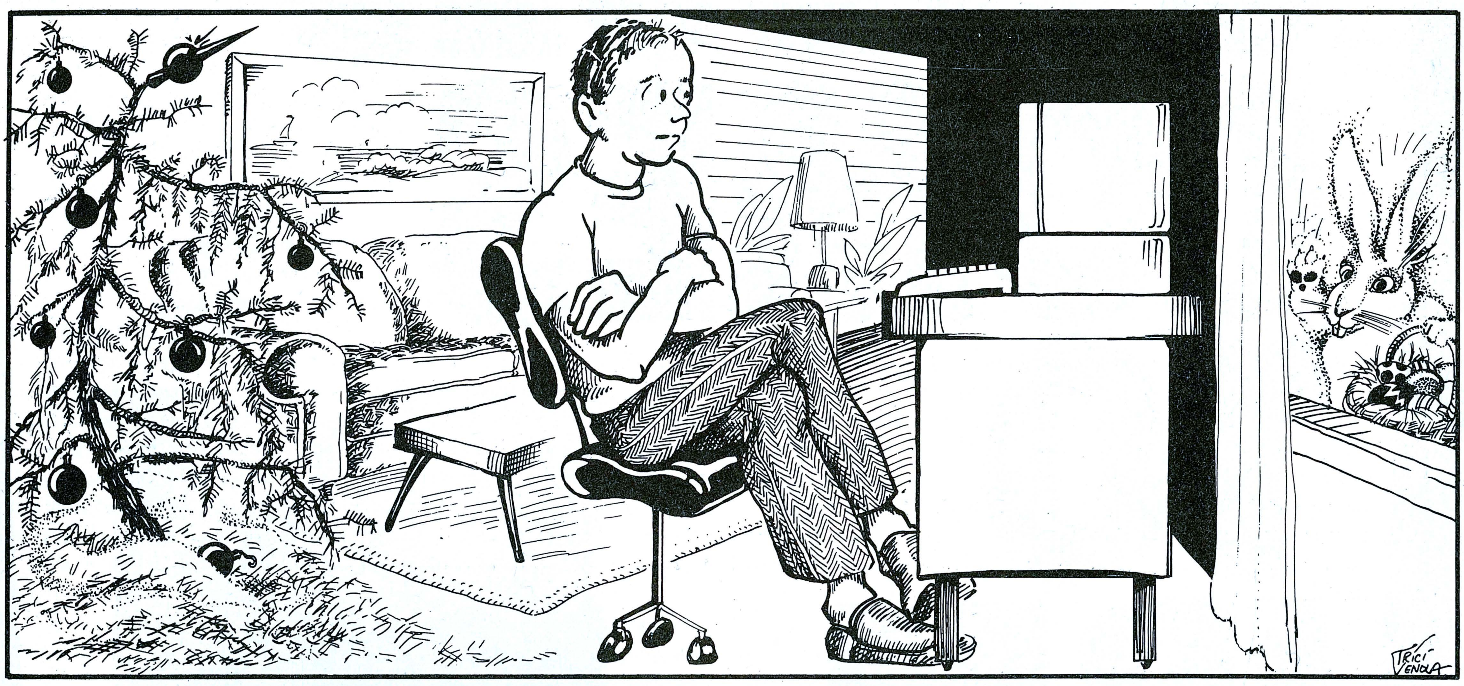

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beginners' corner

and data—and to convert them into electronic signals that cause the computer to take the appropriate actions. A Basic interpreter also does a few other things that come under the heading of creating a programming *environment*. All those file-handling functions that were discussed in this column two months ago, for example, come to you courtesy of the IBM's Basic interpreter. So do a few other tricks, such as the listing of programs in order of ascending line number—regardless of the sequence in which the lines were originally typed.

The Turning Point. It's customary for Basic interpreters on personal computers to be stored in ROM. That way the language is available to you as soon as you turn on the machine. Well, almost as soon as you turn it on.

On the IBM Personal Computer, you're probably used to getting Basic from your DOS disk, by typing either Basic or BasicA. In other words, Basic most likely doesn't appear immediately on your screen. You've probably also had the experience, though, of turning the computer on without any disk in drive A and finding yourself suddenly peering at the Basic interpreter (looking at Basic's *Ok* prompt).

Here's what's going on. The Personal Computer comes with one version of Basic, called Cassette Basic, built-in, stored in ROM. PC-DOS, an optional piece of system software, includes two additional versions, known as Disk Basic and Advanced Basic. These two additional Basics are not part of the operating system, but they operate in conjunction with it.

They are also, by themselves, not complete Basics. Instead they work in harmony with the Basic in ROM—Cassette Basic. The bulk of the code that allows you to write programs in Basic is stored in read-only memory; the two Basics that come with DOS merely add features.

If you have a disk drive installed, then when you turn your machine on or hit control-alt-delete, one of the first things that happens is that your computer attempts to get instructions from drive A. If you don't have a disk there, or if you leave the drive door open, the red light goes out after a bit and the computer leaves you in the benevolent hands of Cassette Basic.

Secrets of the Disk. If you do have a disk in drive A, then, of course, what happens depends on what's on the disk. If it's a DOS disk (one that has the DOS system files stored on it), then you're delivered to DOS and given DOS's A> prompt. If it's a DOS disk that has on it a file named Autoexec.bat, then in most cases you go straight into some application program.

One of the things that DOS is programmed to do, whenever it's booted, is look for a file named Autoexec.bat (.bat stands for *batch*). If such a file exists, DOS passes control to it; and autoexec files are usually used as a way of taking you directly into an application program, sparing you the trouble of issuing commands to load and run the program.

In any case, to get to either of the two "extra" Basics, the so-called Disk Basic or Advanced Basic, you have to issue a command to DOS: either ***Basic***, for Disk Basic, or *BasicA*, for Advanced Basic (or you can create an autoexec file that will issue one of those commands for you; see System Notebook, October 1982).

Why does the IBM pc offer all those separate versions of Basic and why, if you want to write a program, do you have to go by way of DOS to get to Disk Basic or Advanced Basic? Couple of reasons.

First, to preserve memory for cassette users. After all, it certainly is possible to use your Personal Computer without any disk drives. Programs and data can be stored on magnetic tape by way of the computer's cassette port (at the back of the machine, directly beside the place where the keyboard is connected). Tape storage is much less convenient than disk storage, primarily because the computer has to read a tape sequentially (it can't just hop directly out to some de-

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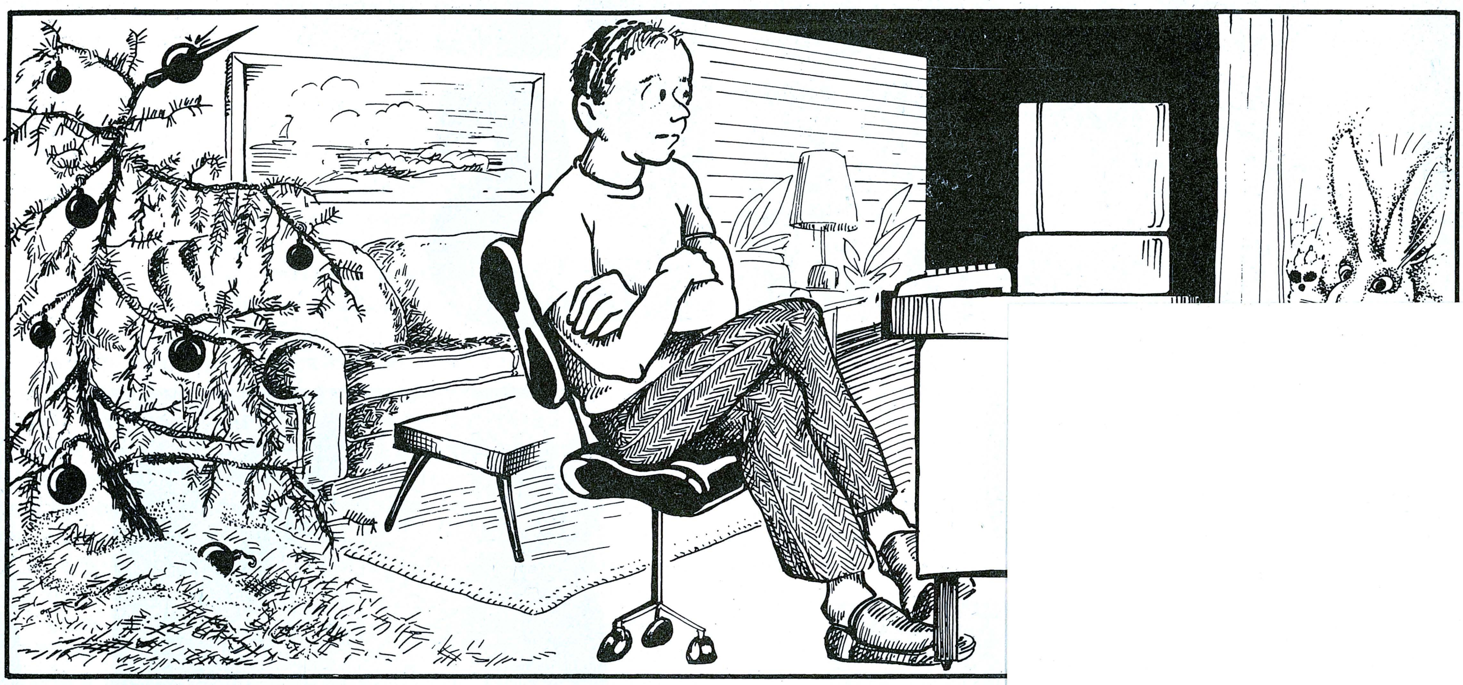

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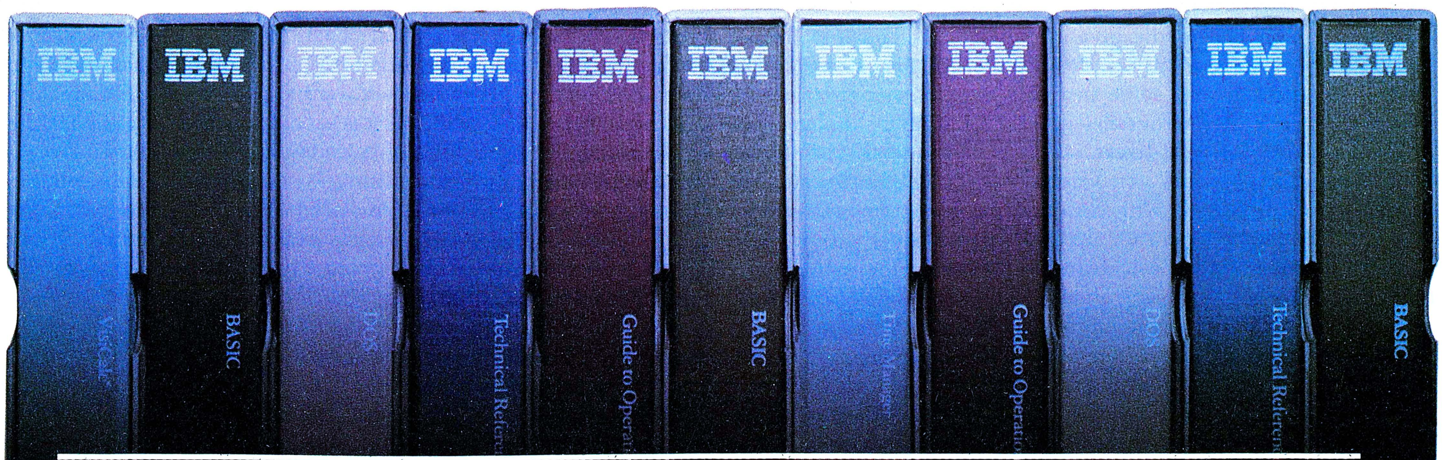

beginners' corner

by Craig Stinson

Most personal computers on the market today have a built-in capacity to understand programs written in Basic. They don't all offer the same form of Basic, for Basic, like English and other widely used tongues, exists in many dialects. But the ability to handle at least some variant of Basic is an almost universal feature of personal computers.

No computer, however, actually *understands* Basic. Not directly. They all have a little guy inside the box who translates Basic into the kind of lingo that computers really do understand. That little guy is itself a program—written in so-called machine language—known as a Basic interpreter.

A Basic interpreter is *programmed* to recognize the constructs of Basic—commands and data—and to convert them into electronic signals that cause the computer to take the appropriate actions. A Basic interpreter also does a few other things that come under the heading of creating a programming *environment*. All those file-handling functions that were discussed in this column two months ago, for example, come to you courtesy of the IBM's Basic interpreter. So do a few other tricks, such as the listing of programs in order of ascending line number—regardless of the sequence in which the lines were originally typed.

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Secrets of the Disk. If you do have a disk in drive A, then, of course, what happens depends on what's on the disk. If it's a DOS disk (one that has the DOS system files stored on it), then you're delivered to DOS and given DOS's A> prompt. If it's a DOS disk that has on it a file named Autoexec.bat, then in most cases you go straight into some application program.

One of the things that DOS is programmed to do, whenever it's booted, is look for a file named Autoexec.bat (.bat stands for *batch*). If such a file exists, DOS passes control to it; and autoexec files are usually used as a way of taking you directly into an application program, sparing you the trouble of issuing commands to load and run the program.

In any case, to get to either of the two "extra" Basics, the so-called Disk Basic or Advanced Basic, you have to issue a command to DOS: either *Basic*, for Disk Basic, or *BasicA*, for Advanced Basic (or you can create an autoexec file that will issue one of those commands for you; see System Notebook, October 1982).

Why does the IBM pc offer all those separate versions of Basic and why, if you want to write a program, do you have to go by way of DOS to get to Disk Basic or Advanced Basic? Couple of reasons.

First, to preserve memory for cassette users. After all, it certainly is possible to use your Personal Computer without any disk drives. Programs and data can be stored on magnetic tape by way of the computer's cassette port (at the back of the machine, directly beside the place where the keyboard is connected). Tape storage is much less convenient than disk storage, primarily because the computer has to read a tape sequentially (it can't just hop directly out to some desired location in the middle of a cassette), and commercial software on cassette for the IBM is nonexistent, but some people who mostly use their own programs get along quite nicely without disk drives.

A Basic Hangover. If you were a programmer working strictly with cassette tape, you wouldn't want to clutter up valuable space in memory with Basic features that had only to do with disk operations. Keeping those features out leaves more room in memory for data and application programs. That's one reason why Disk Basic and Advanced Basic are not kept in ROM.

To understand the other reason, recall that when you issue a Basic command involving the disk, such as *files*, you're asking Basic to convey an order to the operating system. The operating system handles all transfer of information between disk and computer, so any implementation of Basic (or any other programming language) that allows for disk filing must work in the context of some particular operating system.

IBM, for whatever reasons, chose *not* to create a single proprietary operating system for the Personal Computer (the way Apple and Tandy, for example, did for their computers). PC-DOS got a large head start by being available for the IBM much sooner than its competition (chiefly CP/M-86 and the UCSD p-System), and IBM gave it a big boost by setting its price at a nominal $40; but it's not the only game in town. And because the operating system is not built into ROM, those elements of Basic that require the cooperation of the operating system have to be loaded into memory from disk as well.

Two on the Town. So why does PC-DOS come with two versions of Basic? Again the reason is memory conservation. The advanced version of Basic takes up about five thousand more units *(bytes)* in memory than the regular Disk Basic. As a result of that difference, it's possible to use Disk Basic on a pc whose RAM capacity is 32K (a little over thirty-two thousand bytes). BasicA, on the other hand, requires a minimum of 48K. So the separate versions are provided partly for the convenience of users of smaller systems.

Even for those with 48K, 64K, or larger systems, however, the extra five thousand bytes consumed by Advanced Basic have the effect of reducing the amount of memory left over for an application program and any data it may use or create. If your program is small or your memory capacity quite large, it probably won't make any difference which Basic you use. If your resources are limited, however, and your program doesn't require the extra features supplied by Advanced Basic, you may find it runs more efficiently in the regular Disk Basic.

Advanced Basic's extra features fall into three categories. First, there are five graphics commands in the advanced version of Basic that are absent from Cassette and Disk Basic. These commands facilitate the drawing of figures in medium and high resolution graphics. Second, the advanced version includes a *play* command that makes it easy to program music on the computer's built-in speaker.

Finally, Advanced Basic includes features that allow the Personal Computer to do *event trapping*. That means you can program your computer to be on the lookout for certain occurrences on its periphery and to respond appropriately should it detect such an occurrence. The "events" you can "trap" include the pressing of a function key, an incoming call on a communications line, the pressing of a joystick button, and the activation of a light pen.

Before leaving the subject of versions of Basic, it's probably worth mentioning that there are other Basics that run in conjunction with other operating systems. Unlike the two on the DOS disk, however, these other versions of the language probably don't merely complement and extend the Cassette Basic that's stored in ROM. It's conceivable that other Basics could make use of certain routines that are part of Cassette Basic, but it's not likely they'd do so extensively. So Basics that run in operating systems other than DOS are likely to impose a significantly larger memory overhead than the Disk Basic and Advanced Basic we've been discussing here.

The High and the Mighty. Basic is an example of what's called a *high-level* programming language. This means that compared to other ways of programming computers, Basic allows us to work in terms that are *relatively* similar to those in which we normally think and correspondingly distant from the computer's native way of understanding things.

This means that a high-level language's vocabulary will probably look more like English than will that of a lower-level language. For example:

```
10 CLS
20 LOCATE 10,15
30 PRINT TIME$
40 GOTO 20
```

is easier for most of us to decipher than, say,

```
5663    MOV     DS,AX
5664    POP     AX
5665    OR      AH,AH
5666    JZ      T2
```

More important, however, the description of a language as high-level implies that the language allows you to program fairly complex procedures with a relatively small amount of code. The four lines of Basic you just read constitute a complete program to print the time of day on your screen (try it; when you want to quit the program, hold the control key and hit scroll-lock). The four lines of *assembly language* shown below the Basic listing are a small part of the routine stored in ROM that enables your Personal Computer to keep track of the time of day. The complete routine (listed in IBM's *Technical Reference Manual*, pages A-77 to A-79) runs a couple hundred lines.

When people speak of low-level language, they're usually referring to assembly language, which is also sometimes colloquially called *machine language*. Another installment of this column will have more to say about assembly language, but it's probably worth pointing out here that machine language and assembly language are *not* the same thing, colloquialisms notwithstanding. Assembly language programs are communicated to the computer in the form of *mnemonics*—like POP, OR, and MOV. There are altogether 105 of these mnemonics in the vocabulary of the pc's assembly language.

True machine language, on any digital computer, is quite a bit more constrained in its vocabulary. When you get to the very bottom of the matter, your computer only understands two kinds of signals. Usually these two are named zero and one, but you could just as well call them off and on or Mutt and Jeff. Of course these two signal types can take on a vast number of different meanings, depending upon the context in which they appear.

All the variety of things that your computer is capable of doing are achieved, in fact, by permuting (changing the arrangement of) an enormous sequence of zeros and ones in different fashions. But we're getting ahead of the story; this is a subject to which we'll return.

Meanwhile, back to Basic. Basic is one of many high-level languages available for use on the Personal Computer. Some of your alternatives for a programming medium include Pascal, Fortran, Forth, and Cobol. A good many others will be coming along in the near future.

Each of these languages has its raisons d'etre and its adherents.

Pascal is much in vogue these days because it's a language that encourages and demands a disciplined approach to programming. It also tends to foster the creation of programs that are—especially by comparison to Basic programs—relatively easy to modify and maintain. For complex applications, ease of program maintenance may be as important a consideration to a programmer as the conditions under which a program is originally written. Pascal is a clear second in popularity amongst microcomputer users.

Born To Run. Fortran (the name is short for *formula translator*) is the elder citizen of programming languages. A monumental achievement of the 1950s, it was for more than a decade the standard medium for teaching programming in beginning-level university classes; it's now been pretty well supplanted for that purpose by Pascal. Fortran's forte appears to be scientific, technical, and other so-called number-crunching applications. In its original form it was not designed to handle text easily, and despite extensions that have been made to the language over the years, it's still clumsy with words.

Forth is often described as a *threaded* language. What this means is that a programmer can extend the vocabulary of Forth by defining new concepts in terms of old ones and giving them single-word identifiers. It's also a sort of bare-hands programming medium that, compared to other languages, imposes relatively little environmental overhead between the programmer and the machine; that is, Forth doesn't automatically provide much in the way of amenities to assist programmers or to prevent them from screwing up. Of course, the Forth programmer can extend the language to include such amenities if he wants them. Forth was designed originally as a tool for controlling industrial (and particularly astronomical) equipment; today it has a small, but enthusiastic and individualistic, following.

Cobol (an acronym for *common business-oriented language)* is a relative newcomer to the personal computer scene, but it's extensively used for programming business applications on larger computers. It's well suited for handling large amounts of data (personnel records, accounting files, and other such things). One reason it hasn't made large inroads into the microcomputer world is that until recently microcomputers were not really adequate to handle the kinds of applications for which Cobol is best suited. This picture is beginning to change, however; with the vastly increased amounts of memory available on the newest generation of personal computers (including your pc) and the development of local-area networking of microcomputers, the use of Cobol may become more widespread.

Basic History. Basic has been around for about twenty years. It was developed in the early 1960s by a couple of professors at Dartmouth College who wanted to provide an easy alternative to Fortran, as a way of making computing more attractive to students who lacked extensive mathematical or engineering backgrounds. The name Basic stands for *beginners' all-purpose symbolic instruction code.*

One reason that Basic has become as popular as it has and why it tends to appeal to beginning programmers is the fact that it's usually implemented as an *interpreted* language. Here's what that means.

Remember the Basic interpreter—that little guy in the box who translates all your Basic statements into ones and zeros so the computer can carry out your instructions? Well, all higher-level languages have to have some kind of tool to perform that translation function, but not all of them do it by means of an interpreter. It's more common, in fact, for programming languages to be converted to machine code by means of a *compiler.*

The difference between an interpreter and a compiler has to do with when—and, as a consequence, how often—the high-level code is translated. Interpreters do their work one line at a time, *as you run your program.* A compiler does its translating up front, before a program is run for the first time.

Take, as an example, that little program we saw earlier in this article—the one that displayed the time of day. The last instruction in that program caused a jump to an earlier instruction, so the program went round and round, executing the same sequence of code over and over. When this program is run in an interpretive environment, that little cluster of instructions has to be retranslated every time it's executed. Every time it encounters *print time$*, the computer has to send off to the interpreter to find out what in the dickens it is you want and who time$ is. From the standpoint of execution speed, this is clearly not the most efficient way to do things.

The Basic Object. If you had a compiler handy, you could take this bit of high-level or *source* code, run it by the compiler, and come out with a piece of machine-level or *object* code. Thereafter you wouldn't need the original Basic instructions, unless you wanted a reference to remind you how your program worked or you wanted to modify the program. The compiled program would run much more quickly than the Basic original.

There is, in fact, at least one compiler available for the Basics that come with PC-DOS. How much faster it will make a program run depends on the program. Programs that spend most of their time sending data to or retrieving it from disk are not likely to show a lot of improvement; programs that do a lot of repetitive calculation, on the other hand, may run ten to twenty times faster than their interpreted equivalents.

Apart from increases in execution speed, there's a second reason some programmers like to use compilers. Compiled code is harder than normal high-level Basic code for a would-be pirate to decipher and steal.

So if compilers are so much more efficient than interpreters, how is it that Basic owes its popularity partly to the fact that it's customarily interpreted? We'll take up that question next time. ▲

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BOARDS & BUSES

by Richard Kaapke

Our subject this month is communications.

This is a rather broad term that covers everything from transatlantic conversations via satellite to the exchange of information between your computer's memory and its disk drives. In the realm of computers, the concept of communications embraces any transfer of data between a computer and one of its peripheral devices or between one computer and another.

Obviously that's too grand a scope for a single article. We'll restrict ourselves here to a few of the important concepts concerning asynchronous serial communications.

Let's start by unraveling the language a little.

Digital computers store and process information in the form of signals that represent zeros and ones. Each such signal, representing either a zero or a one, conveys one *bit* of information (the term *bit* is an abbreviation of the words *binary digit*); microcomputers generally move information around in groups of eight bits, which are said to make up a *byte*.

Traffic Signals versus Stop Signs. Broadly (and somewhat approximately) speaking, there are two ways in which a computer can send data to a peripheral or another computer. It can send the information in chunks (a byte at a time, perhaps) by transmitting a group of signals simultaneously over separate lines. Communications effected in this manner are described as *parallel*. Or it can send the data one bit at a time, in which case the communication is *serial*.

Information transmitted between computing devices takes the form of two distinct states of either voltage or current. One state is used to represent bit values of zero and the other bit values of one. A serial data stream thus can be thought of as a wire in which some electrical property varies across time.

The device on the receiving end has to look at that wire at the appropriate moments in time and measure the relevant electrical property. Obviously, then, timing is crucial. The receiving device has to stay in synchronization with the sending device in order to know where the boundaries are between one bit and another, and between one byte and another.

Devices that communicate *synchronously* send timing signals between every two data signals. In other words, every one or zero sent is followed by a separate synchronization signal. This is a relatively reliable way of communicating, but it's also relatively complex from a hardware point of view.

The method of transmission that's more typical of microcomputer communications is called *asynchronous*. This term is something of a misnomer, because synchronization signals are still sent; but they're only sent between bytes, not between each pair of bits. In asynchronous communications, each character (which may be only seven bits instead of a full byte, because seven bits are sufficient to define a character, using the standard ASCII code) is preceded by a start bit and followed by one or more stop bits.

Getting To Know Each Other. Before your computer can communicate with another computer or a peripheral, it has to have something called an interface. Actually, the term *interface* just describes the boundary between two devices; the word is generally used as shorthand for *interface adapter*, and an interface adapter is a piece of equipment, typically a card, that provides mechanical and electrical connection between two devices in communication with one another. An interface adapter is also known colloquially as a *port*.

It's also necessary that the sending and receiving equipment get their signals straight, so to speak. That means they have to agree about how the various wires that physically connect them are to be used. And they have to agree on such matters as the number of stop bits to be sent between each byte, whether parity bits will be sent along with the data (and if so, what kind of parity bits), and so on. Parity, you may recall, is a method of error checking. The sending device adds the number of ones in each data byte it transmits, then sets an accompanying parity bit in such a fashion that the total number of ones in that byte (including the parity bit) will either be even or odd—even if the communicants have agreed on *even parity*, odd if they've selected *odd parity*. When the byte gets to the other end of the line, the receiving device can check to see that the parity bit is set correctly; if it isn't, then some bit has changed its status during transmission and the receiver knows that byte of data is not reliable.

The most commonly used physical arrangement for serial communications in the microcomputer world is known as RS232-C. You may occasionally also see the letters EIA associated with RS232-C, since the RS232-C interface was defined in a document published by the Electronic Industries Association.

The Next Installment. The IBM Asynchronous Communications Adapter, which is the serial port sold by IBM, attaches to the outside world by way of a twenty-five-pin D-shaped connector (figure 1). This connector is often called an RS232-C connector, because its pin numbers and their functions conform to the standard defined in that EIA document. There are a good many other

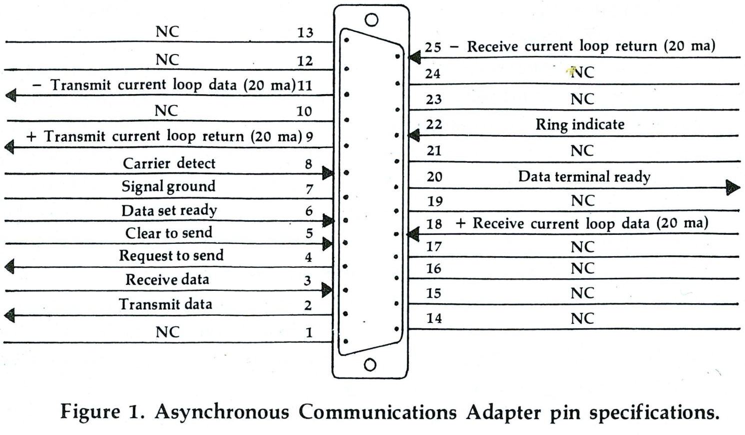


Figure 1. Asynchronous Communications Adapter pin specifications.

serial ports available for the pc (many of them offered as accessories to memory boards); their connectors are identical in function to that of IBM's asynch adapter.

At the heart of the RS232-C connector are three wires: a *receive* line, where incoming data is read; a *transmit* line, over which outgoing information is sent; and a signal ground, used as a reference point by the other two lines. Ones and zeros, sent via RS232-C, are distinguished by voltage. One signal is identified by a positive voltage, the other by a negative voltage—as compared to the signal ground.

Obviously, if you were to connect two devices by means of these three wires, you wouldn't want to attach the transmit line of one to the transmit line of the other or the receive line of one to the receive line of the other. (You could, however, and in fact you *must*, connect the two ground lines.) To put it another way, it wouldn't work to have both devices using the same line for outgoing data; rather, you want the output from one device to be the input to the other—and vice versa.

For this reason, there are two standard configurations for the RS232-C connector. One goes by the name *DTE*, for Data Terminal Equipment, and the other is called *DCE*, for Data Communications Equipment.

To DTE or To DCE. The IBM Asynchronous Communications Adapter (and similar serial ports that plug into a pc slot) is set up to be a DTE, which means the pc is meant to be a terminal. A terminal is a device that can either receive or transmit data.

A DCE device, in contrast to a terminal, is intended only to communicate data from one DTE to another—usually over a phone line by way of another DCE. A good example of a DCE device is a modem.

A modem, or *mo*dulator-*dem*odulator, translates data from a DTE (for example, from an IBM pc) into sounds that represent ones and zeros. It then sends these sounds across a phone line to another modem, which decodes them and sends the data to the computer, or other DTE device, at the other end of the line.

Modems, by the bye, may be configured as RS232-C DCE devices for the purposes of receiving information from a DTE, but for the purpose of sending that data on to a receiving modem or for receiving data from another modem, they obey a different standard altogether.

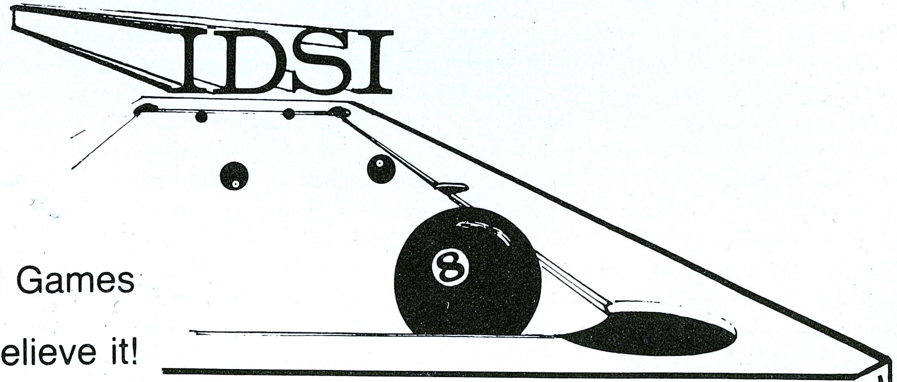
The most commonly used standard for transmission of information via modem, in the microcomputer world, is called Bell 103. Among other things, the Bell 103 standard specifies what frequencies of sound will be used to represent the various elements of information to be transmitted.

Bell 103 modems use one pair of frequencies to represent one and zero when the data is traveling in one direction, and another when the data is traveling the other way. The modem that initiates the call is said to be in the *originate* mode, while the one that responds operates in the *answer* mode. The originating and answering modems transmit at frequencies that are distinct from one another, so that there won't be any confusion about who's speaking. Without the separation of signals achieved by these distinct frequency bands, communication is still possible but much trickier.

Modems are the simplest way to communicate with another device miles away from you, but they are not as practical for communication between devices within the same room or, for that matter, devices within the same building. Can one DTE device be hooked to another without modems or other DCE devices? The answer is yes.

Wired for Elimination. To bypass DCE equipment simply requires that you hook up the wires so that transmit on one end is connected to receive on the other. The typical reversal of wires is called a *modem eliminator*, for obvious reasons. A modem eliminator allows you to connect two DTE devices directly, so that your computer can talk to another computer without going by way of phone lines, or so that your computer can talk to your serial printer.

Yes, serial printers are DTE devices. This is a fact that has caused considerable confu-



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sion recently—so much confusion that certain retailers go out of their way to steer customers toward parallel printers. (Actually, that's not such a bum steer, since parallel printers are generally less expensive and the pc's default mode assumes that your printer is parallel; see Boards and Buses, September 1982.)

Meanwhile, perhaps you're wondering why that RS232-C connector has twenty-five pins when it seems that three will do the job. Easy to wonder, but less easy to explain. For some situations, three actually are enough, but in others more are required.

Figure 1 names the functions of the various pins. Fully a dozen of them, the ones marked "NC," are not used at all; the NC stands for not connected. Another four, the ones with the words *current loop* in their description, have nothing to do with RS232-C. They are used for devices that require another, older, form of connection—about which we'll have more to say momentarily. That leaves six to explain.

Three lines function as controls for modem communications.

Forget To Leave the Answering Machine On? Let's assume that your computer has been programmed to await a call from another computer, by way of modem, and to answer the phone when the call comes in. Helpful information for your computer would include the following: whether the modem was working, whether the phone was ringing, and whether there was a carrier signal on the line. A carrier signal is a background tone used by the Bell 103 standard when there's a connection between two modems but no data is being sent in either direction. If you ever happen to pick up the phone on a call intended for your computer, you'll hear a high, shrill noise instead of a friendly, familiar hello; that noise is the carrier signal.

The Data Set Ready line (pin 7 on the RS232-C connector, abbreviated DSR) provides a signal to the computer that the modem is on and functional. Carrier Detect (pin 8, abbreviated CD) tells the computer or other DTE device that there's a carrier signal on the line. And Ring Indicate (pin 22, RI) informs the DTE device the phone is ringing. This is a sort of alert signal, telling the computer to expect a carrier detect momentarily.

Modems aren't the only communicants that need a few extra control signals. Other DTEs as well may want to say something about their condition.

CTS stands for Clear To Send and is typically used between one DTE and another—for example, between a printer and a computer. The CTS line, pin 5, can be used by a printer to tell a computer whether or not it's ready to receive data for printing. The signal is necessary because printers are never able to process data as fast as a computer can send it; typically a printer takes in a chunk of data, stores it in a buffer, prints it, then sends a CTS signal to the computer when it's ready for more.

Please, Please, Mr. Postman. RTS, standing for Request To Send, is a "polite" signal from the computer to a printer (or other device) informing the receiving device that the computer has something to transmit. Typically the computer sends an RTS and awaits a CTS from the receiving device before going ahead with the transmission.

DTR, which stands for Data Terminal Ready, is analogous to the DSR signal used by modems; it tells a computer that a DTE device on the other end of the line is on and functioning. The DTR, however, is only used when two computers are connected by way of modems, over twenty-five wire cables (ordinary, voice-grade line modem communications don't use DTR signals).

Figure 2 summarizes the usual connections between a serial printer and a computer. This chart isn't accurate for every conceivable serial printer, but it's a good guideline. Note that the modem controls, RI, DSR, and CD, are not connected; they're meaningless, after all, unless a modem is being used. Certain printers, however, do require these signals and have to be fooled into believing there's a DCE device on the line.

The remaining four pins shown in figure 1 are used for an older method of data transmission called *current loop*. This interface consists of two separate circuits, one for data traveling in each direction between two devices. Each circuit has an outgoing line and an ingoing line; the outgoing and ingoing lines form a complete electrical circuit, or loop, with the other communicating device in the middle.

Computer		Printer
TD (Transmit Data)	to	RD (Receive Data)
RD (Receive Data)	to	TD (Transmit Data)
RTS (Request To Send)	to	RTS (Request To Send)*
CTS (Clear To Send)	to	CTS (Clear To Send)**
SG (Signal Ground)	to	SG (Signal Ground)
RI (Ring Indicate)		Not Connected
DSR (Data Set Ready)		These lines on both sides are connected together and not brought across.
CD (Carrier Detect)		
DTR (Data Terminal Ready)		

Figure 2. Typical connection between an IBM Personal Computer and a serial printer.

*On serial printers, RTS is an input; on the computer, it's strictly an output. In some circumstances, this line is either unconnected or tied to CTS on the computer side and not brought across.

**On serial printers, CTS is an output; on the computer, it's strictly an input. In some circumstances, this line is either unconnected or tied to RTS on the computer side and not brought across.

Data is represented by the presence or absence of current in this loop. Current means a one; no current means a zero.

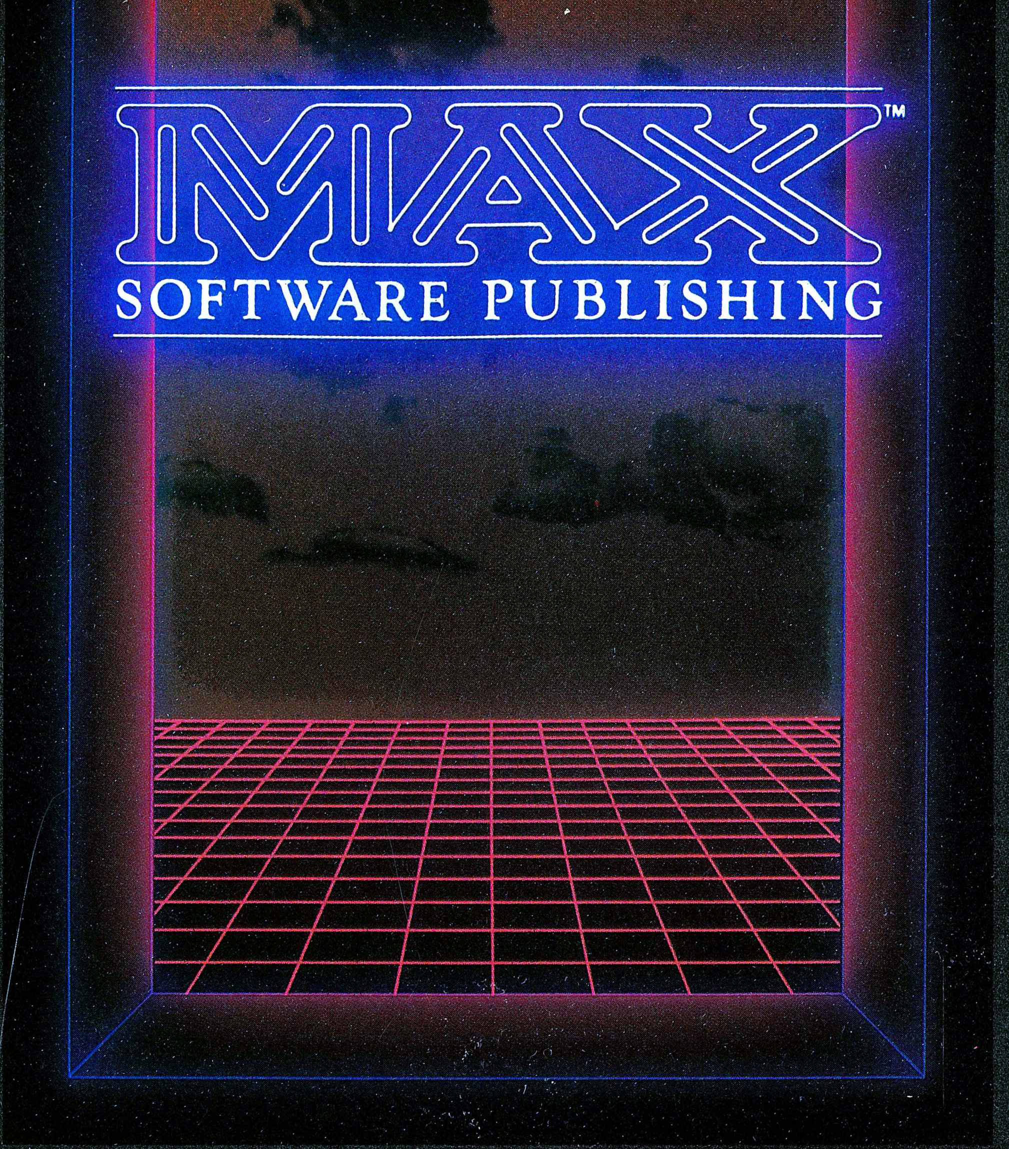
The current loop interface is not much in vogue these days. It's included on the IBM Asynchronous Adapter for the benefit of those who need to drive older Teletype equipment (printers or paper tape punches). Even the newer Teletype equipment runs on RS232-C. Serial ports sold by manufacturers other than IBM may or may not include a current loop interface; if they do include it, it may or may not match the pin locations used by the IBM adapter.

Communications is a difficult and often confusing aspect of the computer world. Partly that's because hardware is much less ephemeral than software. The presence in the market of fast, efficient serial printers is no reason to throw an old Teletype out of the computer room—if the Teletype still works. So hardware standards that have been superseded technologically tend to hang around anyway.

Breaking Away. The terminology associated with older methods also tends to persist in usage, sometimes further confusing the picture. The term *break*, for example, is a carry-over from Teletype days, when terminals were provided with a key that would physically break the current loop circuit, causing an interruption in the communication. Many modern keyboards, like that of the IBM pc, still have a key marked Break, but that key, rather than physically disrupting a circuit, merely sends a character—just as any other key on the keyboard does.

RS232-C, like current loop, will no doubt be supplanted in time by better approaches to serial interfacing. And, no doubt, its associated terminology will linger on and clutter up the language of that day.

But RS232-C will probably be with us for a while. Despite the fact that this standard is sometimes not as standard as one would like (a situation that may be remedied somewhat as more manufacturers make more communications products), RS232-C has served its function well. Among other things it has provided a means whereby one brand of computer can exchange information with another; in that sense, despite its idiosyncrasies, RS232-C has proved to be a standard in a way that disk media never have. And, in conjunction with a few other standards like Bell 103 and the ASCII code, it has enabled you to tap into information utilities and databases anywhere the phone system goes, putting the whole world at the disposal of your Personal Computer. ▲



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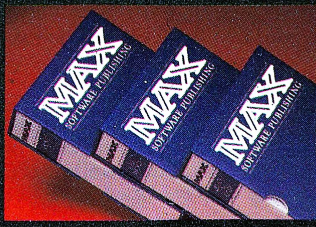

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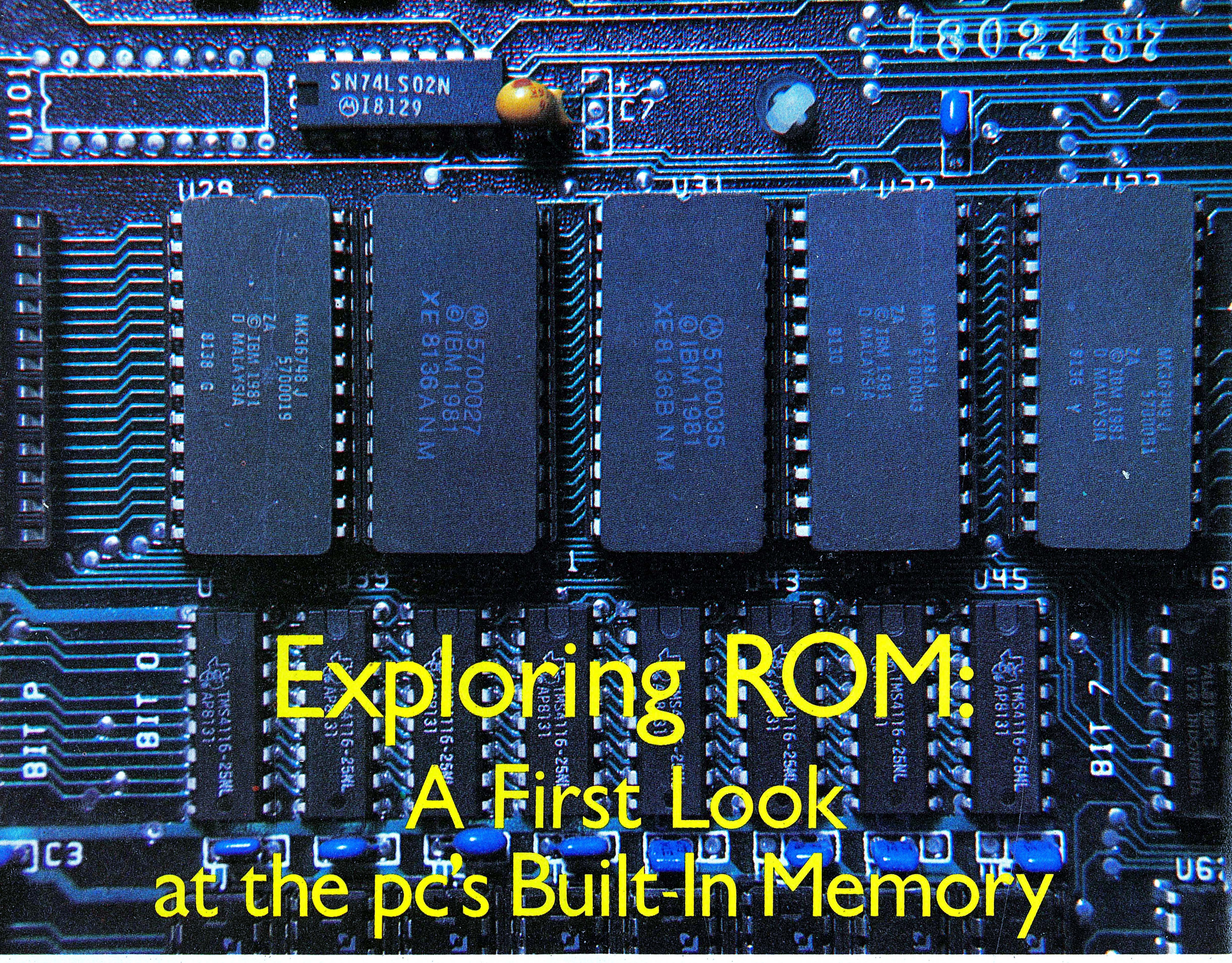

Exploring ROM:
A First Look at the pc's Built-In Memory

by Peter Norton

The programs that are stored in read-only memory (ROM) make up one of the most critical and useful parts of the IBM Personal Computer. Here we'll take a brief look at them and show you some basics of how to snoop around in ROM programs and make sense of them.

There are three parts to the ROM storage for the pc, all placed at the highest address locations of the pc's megabyte address space. At the top, beginning at the hexadecimal address FE000 and extending for 8K to the end of memory, is the ROM BIOS, or *Basic Input/Output System.* The ROM BIOS is responsible for all of the built-in support of the pc's I/O devices, such as the display screen and the disk drives. The ROM BIOS is extremely interesting to anyone who wants to master all the special tricks that the pc can do. (A follow-up to this article will cover the ROM BIOS in greater detail.)

The Basic Core. The second part of the ROM, beginning at address F6000 and extending for 32K, contains the ROM Basic routines. The ROM Basic provides the core of the interpreter Basic for the pc; all of Cassette Basic is located in this ROM, and the major portion of Disk Basic and Advanced Basic is here as well. In fact, all that the two disk versions of Basic do is add features to the ROM Basic, which by itself is a complete Basic that contains the lion's share of the programs needed by the disk versions.

A large number of potentially useful subroutines must be buried inside the ROM Basic. If Basic uses them, why not our own programs? But we'll have to leave the ambitious project of accessing these subroutines from our own programs for another time.

The third part of ROM is the part that isn't there. This area is available for IBM to add new ROM programs or for users to add built-in programs to customize their computers. Extra ROM programs can be added nearly anywhere in the megabyte address space, but the location especially reserved for such programs is the block that begins at F4000 and extends for 8K up to the beginning of Basic; if more than 8K is needed, a ROM program can begin at an earlier location.

The most interesting part of ROM is the ROM BIOS. Before we get into that, however, we need to cover the subject of exploration in ROM—in other words, how to snoop.

The key tool for snooping is the Debug program, which is part of DOS. Debug provides two things we need: access to any section of memory and the ability to list memory in two formats. The first

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format displays the contents of memory in both hexadecimal and ASCII, and the second gives us an *unassembled* display.

What's Unassemby? Machine-language programs are almost completely unintelligible to humans. Even for computers that have relatively simple instruction formats, machine language is a mess to comprehend. And the 8088 microprocessor, which is the heart of the pc, has a very intricate coding for its machine language. Most microprocessors are this way; their designers have sacrificed simplicity for maximum power and, especially, for compactness of code. As a consequence, it takes a great deal of labor for someone to look over and make sense of a hexadecimal listing of machine-language code.

The unassembly process, furnished by Debug, takes some of the brutal labor out of interpreting machine language. Unassembly is simply the process of translating the absolute hexadecimal machine language instructions into corresponding assembly language symbolic notation.

For example, in assembly language you might write

```
INC AX
```

meaning *increment the AX register* (add 1 to its current value). The assembler would translate that instruction into the machine language hex code 40. Working in reverse, the unassembler would translate hex 40 back into

```
INC AX
```

Hex code 40 is a relatively easy instruction code to translate by hand, assuming you have a table of the 8086 instruction codes. Many other codes, however, are much harder, because various bits change the meaning of the instruction. The troublesome task of decoding all the bits, in all their intricacy, is taken care of for us by Debug's unassemble facility.

While an unassembler can turn machine language into more readable assembler code, it can't reconstruct certain of the more useful parts of the original assembly language source code. Obviously it won't create the programmer's helpful comments out of thin air. But it also won't assign meaningful, helpful symbolic names to locations. So whereas the author's original source code might have had

```
JMP FINISH  ; Done—go to finish routine
```

the unassembler can only give us something like

```
JMP 0E6C
```

From that, we'd know the instruction was a jump, but we wouldn't know its significance.

Just the Facts, Ma'am. Needless to say, unassembly doesn't do all our work for us. In particular, it doesn't make any sense of the program that's unassembled. But at least it tells us what instructions have been found, and it gives us clues about whether we're looking at program instructions or program data.

To show how you can explore ROM programs, let's use the ROM Basic routines as an example. We'll step through the process of using Debug to see what's going on there.

Most of what you need to know for the process of snooping will be either explained here or made fairly clear by example. But to understand Debug fully, you should also read the relevant section of the DOS manual. It's not the easiest part of the manual to understand, but many of the technical details covered there will eventually be important to you.

```
A>
A>DEBUG
-S F000:0000 L FFFF "Illegal function call"
F000:63F4
```

Figure 1. Starting Debug and searching.

If you're a newcomer to Debug, here is some background. Like other commands, Debug is invoked by typing its name. While the program is running it will prompt you for commands with a very terse hyphen; don't expect the more lavish DOS prompt *A>*.

Most things you do with Debug will result in the appearance of listings on screen, but you may also want copies on your printer, so you'll have a permanent copy on which you can make notes. Debug isn't set up to send output to the printer, but you'll recall that there are two ways you can get almost anything printed. One is to use the PrtSc key to make a copy of the current display; the other is to turn on the printer echo feature by pressing control-PrtSc.

An Echo Not Everyone Hears. Many pc users don't know about the echo feature. Echo is toggled on or off by pressing control-PrtSc; when echo is in effect, any conventional output to the screen will be copied (echoed) to the printer.

We've decided to explore ROM Basic, and we happen to know that Basic starts at memory location F6000. So we can start Debug and immediately instruct it to list the contents of memory starting at F6000.

But suppose we didn't know that what we were looking for started at F6000? There are two ways we could go about locating some particular item in memory. One would be to use Debug's *D* command (for *dump* or *display*) over and over until we stumbled onto the thing we were looking for. A simpler, more efficient method would be to use Debug's search capability.

As an example, let's hunt for the Basic error message, "Illegal function call." Figure 1 shows the commands we'd use to get Debug running and search for that error message.

The search command consists of the letter *S*, followed by a memory range, followed by the object of the search. The memory range shown in figure 1 consists of a starting address, then the letter *L* for *length*, and then the hexadecimal value FFFF (equivalent to 65,535 in decimal notation). So we're asking Debug to start looking at address F0000 and scan forward for 65,535 bytes until it finds "Illegal function call."

Notice that the starting address is expressed as a base (the part before the colon) plus an offset. We're asking Debug to begin at an offset of zero bytes from a base address of F0000. Notice further that the base address is given as F000; the final zero is implied.

If you remove the rightmost zero from a hexadecimal number, you diminish that number by a factor of sixteen. So the address where we wish Debug to begin its search is actually sixteen times greater than the number specified before the colon. A unit of sixteen bytes of memory is sometimes called a paragraph, so you can think of the base address in a Debug command as a base paragraph; we're asking Debug to start looking from the F600th unit of

```
-D F600:03E0
F600:03E0   74 20 47 4F 53 55 42 00-4F 75 74 20 6F 66 20 44   t GOSUB.Out of D
F600:03F0   41 54 41 00 49 6C 6C 65-67 61 6C 20 66 75 6E 63   ATA.Illegal func
F600:0400   74 69 6F 6E 20 63 61 6C-6C 00 4F 76 65 72 66 6C   tion call.Overfl
F600:0410   6F 77 00 4F 75 74 20 6F-66 20 6D 65 6D 6F 72 79   ow.Out of memory
F600:0420   00 55 6E 64 65 66 69 6E-65 64 20 6C 69 6E 65 20   .Undefined line 
F600:0430   6E 75 6D 62 65 72 00 53-75 62 73 63 72 69 70 74   number.Subscript
F600:0440   20 6F 75 74 20 6F 66 20-72 61 6E 67 65 00 44 75    out of range.Du
F600:0450   70 6C 69 63 61 74 65 20-44 65 66 69 6E 69 74 69   plicate Definiti
```

Figure 2.
Displaying the message found.

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sixteen addresses.

Debug reports back in the same format. In this case, it tells us that it found "Illegal function call" at an offset of 63F4 bytes from paragraph F000. The complete address for that location is F0000 + 63F4, or F63F4. So we see that our error message is not very far from the paragraph F600, where we know that Basic begins.

We can list the area surrounding "Illegal function call" by entering the Debug command *D F600:03E0.* Figure 2 shows the results. This command tells Debug to begin displaying just before the address where we found our error message, at an offset of 3E0 bytes from paragraph F600.

Debug responds by listing, in both hexadecimal and ASCII, the contents of eighty bytes. What we see includes our message and various other Basic error messages—just what we might have guessed. If we want to see more, we can just issue another *D* command, without having to specify an address; Debug will display the next eighty bytes, and it will keep displaying successive eighty-byte segments in response to further *D* commands.

Figure 2 illustrates several things worth knowing about the *D* command displays of Debug. One is that the displays are formatted with hex on the left and ASCII characters on the right. Another is that byte values that aren't normally printable are shown as periods in the ASCII display. So that the echo feature can be used with Debug, the program makes sure it doesn't display any unprintable characters that might turn out to be printer control codes.

Because of this idiosyncrasy, you can't rely on the ASCII portion of a Debug display to show everything. Anything that's a standard printable character (or a printable character with the high-order bit set) will be printed; everything else will be converted to periods.

So far you've seen how to use Debug to display or search for ROM data. Next, we'll look at the much trickier task of unassembling and interpreting machine language program code.

The Debug command *U*, for *unassemble*, will translate whatever you point it at into a listing of assembly-language-like coding. What unassemble will do for us is translate absolute hex code into assembly language mnemonics (such as ADD or INC) complete with register indications (such as AX or DS). What it *won't* do is twofold.

Know Thy Codes. First, unassemble will not explain what a program means. To understand the function, effect, or purpose of an unassembled listing, you either have to understand assembly language already or be willing to look up the mnemonic codes in a reference and try to figure out what's going on.

Figuring out what an assembly language program is doing, once you know the codes, is an interesting intellectual exercise—a variety of puzzle solving. With some experience, it becomes much easier than it is at first, partly because you'll have to look up the effects of the instructions less often and partly because you'll learn to recognize and understand the patterns that assembly language instructions make when they're working together.

The second thing that the unassemble command won't do for us is what we might call *synchronization.* Machine language instructions for the 8086 vary in length; many are as short as one byte, while others are as long as six bytes. The variation in length stems from the fact that machine language instructions typically include both a command and some form of *argument* or *operand*—some address, value, or other piece of data upon which the command is to be carried out.

Ungarbling Garbage. If you point Debug's unassembler at some point *within* an instruction (in other words, at what is really data and not instruction), Debug will dutifully do its best to decode what it sees into assembly language instructions. And that may turn out to be very garbled indeed.

Now, if we know, for any reason, where a stream of instructions begins, there's no problem. But if we don't know, then a little experimentation is in order. The basic approach is to let the unassemble command have a go at what you think is a stream of instructions. Then you must study unassemble's output to try to make sense of it. If it doesn't make a reasonable pattern (and in a moment we'll get into some tricks of recognizing reasonable patterns), then

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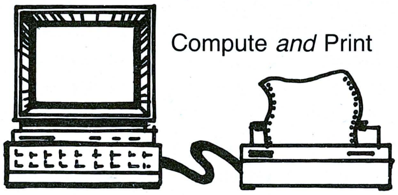

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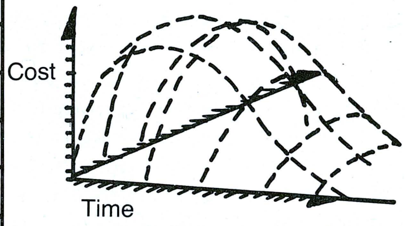

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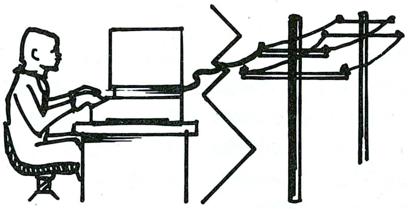

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you should try again, asking unassemble to begin one or two or three bytes ahead of where you tried before. What you're looking for in this procedure is a synchronization point from which a sensible series of instructions procedes. If you don't find the spot at first, try again.

Because many instructions are one or two bytes long, synchronization is often easy. In fact, more often than you might expect, the unassembly process is self-synchronizing. Even if it begins at the wrong point, in the middle of some instruction, the unassembler may stumble onto the proper beginning of a later instruction; and once that happens, the sailing is smooth—at least in the forward direction (you're on your own going backward).

Fancy Factwork. In tracking down an unassembly, you have to be on the lookout for data (as opposed to instructions), which the unassembler will turn into some fanciful assembly listing. The first and fastest check for data is to use the *D* command, to display the memory range in question in hex and ASCII. When you get such a listing, you should first look for the obvious—nice, fat, meaningful ASCII characters, like the "Illegal function call" message we found at F63F4.

Second, you should look for other suspicious signs of data. For example, stretches of zeros are most likely to occur within ordinary programs (although not ROM programs). Other signs suggesting data, rather than instructions, are bytes or two-byte words in which the second byte begins with a 0 or an F; that's because a large proportion of constants stored in programs are small numbers, either positive (in which case they'd begin with a 0) or negative (in which case they'd begin with an F).

In trying to make sense of an unassembled listing, here are some things to keep in mind. Ordinary programs edited with Link (supplied on the DOS disk) will normally have all their instruction parts in one place and their data parts in another; this is a natural consequence of good programming practice and of the way the linker works. This separation of data and instructions is more typical of .exe programs than of .com programs, but it's generally true of either type. On the other hand, ROM programs (like the ones we're exploring in this article) often do not follow the conventions of tidy programming; the data in these may be scattered throughout, interwoven with program instructions.

Gimme Some Truth. There is one sure-fire way to distinguish between the true end of a series of program instructions followed by data and a false unassembly listing that *appears* to be instructions followed by data. The last in a series of machine-language instructions has to be some form of unconditional branch. Branch instructions include all the *jump* instructions, but none of the *jump-if-this-or-that* instructions qualifies as an unconditional jump.

The RET instruction (*return from subroutine*) is a common last instruction. *Call* and *interrupt* instructions also qualify, although they're rarely used as final instructions.

There are several other things you can look for when trying to decide if an unassembly listing is a stream of instructions or a false trail. First consider the registers used. If you see operations involving the registers usually used for arithmetic (AX, AL, or AH; BX, BL, or BH; CX, CL, or CH; DX, DL, or DH) but don't see anything done with the results, be suspicious. Beware, though. Flags are often set as the result of arithmetic operations, so you can expect to find conditional jumps predicated on flag settings (like JNC—*jump if no carry*).

Another thing to look for in registers is unlikely usage. Programs don't dance through the registers; they use them in a coherent pattern. And it's relatively uncommon to be setting, or directly referring to, the segment registers (DS, ES, CS, and SS).

No Rabbit from a Hat. While making sense of an unassembly listing is a challenging intellectual puzzle, it doesn't require any special skill; in fact, common sense and reasonable judgment are what you need most. With the clues you have now and a little prac-

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```
-U F600:0000
F600:0000  E98F7E    JMP    7E92
F600:0003  E8A76B    CALL   6BAD
F600:0006  CB        RET    L
F600:0007  E80265    CALL   650C
F600:000A  CB        RET    L
F600:000B  C1        DB     C1
F600:000C  0000      ADD    [BX+SI],AL
F600:000E  0000      ADD    [BX+SI],AL
F600:0010  0000      ADD    [BX+SI],AL
F600:0012  0000      ADD    [BX+SI],AL
F600:0014  0000      ADD    [BX+SI],AL
F600:0016  0000      ADD    [BX+SI],AL
F600:0018  0000      ADD    [BX+SI],AL
F600:001A  0000      ADD    [BX+SI],AL
F600:001C  0000      ADD    [BX+SI],AL
F600:001E  0000      ADD    [BX+SI],AL
```

Figure 3. Unassembling the beginning of Basic.

```
-U F600:7E92
F600:7E92  FA        CLI
F600:7E93  BA6000    MOV    DX,0060
F600:7E96  8EDA      MOV    DS,DX
F600:7E98  8EC2      MOV    ES,DX
F600:7E9A  8ED2      MOV    SS,DX
F600:7E9C  32C0      XOR    AL,AL
F600:7E9E  A26404    MOV    [0464],AL
F600:7EA1  B591      MOV    CH,91
F600:7EA3  BB0000    MOV    BX,0000
F600:7EA6  BA9A06    MOV    DX,069A
F600:7EA9  8BF2      MOV    SI,DX
F600:7EAB  2E        SEG    CS
F600:7EAC  AC        LODSB
F600:7EAD  8807      MOV    [BX],AL
F600:7EAF  43        INC    BX
F600:7EB0  42        INC    DX
F600:7EB1  FECD      DEC    CH
```

Figure 4. Unassembling more Basic.

tice, you should be able to do it whenever you need to.

As an exercise, let's try unassembling some of ROM Basic. We'll start at the beginning, at paragraph F600. Figure 3 shows an unassembly of the first thirty-two bytes.

All the zeros at the end of this range (which unassemble has translated into ADD instructions) are obviously data. The DB *(define-byte)* that precedes the zeros is the unassembler's response to any code value that doesn't translate into any instruction (this is a rare occurrence, since there are so many instruction codes). Now, is all this data preceded by an unconditional branch of some kind? You bet—a *return* instruction (RET), signifying the end of a subroutine. So far, so good.

The Twilight Zone. Do the first five unassembled instructions make sense? They look a little odd. Beginning with a *jump* (JMP), for example, seems peculiar on first glance. But most programs start with some kind of initialization, often in the form of a call or jump to subroutines farther along in the program. So the beginning jump, while curious, isn't out of the question. And the following four instructions—two pairs of subroutine calls followed by subroutine returns—don't make any sense, but they at least form a coherent pattern. Thus we might be on to some real instruction stream.

So far it's been pointless. Even if what we see in figure 3 is an instruction stream, it's only been five instructions long and does more or less nothing. But what it shows us is rather tasty. If this is a valid instruction stream, it has given us the addresses of three places where we might find something meatier—the locations of the first jump and the two following calls. Shall we follow the jump? The unassembler gives us its address, relative to our starting point of F6000, as 7E92; so let's try unassembling some of that (see figure 4).

Sense of Nonsense. We seem to have struck pay dirt. First, we have coherent instructions—no DBs, no series of ADDs. Second, the instructions we see are just the kind of thing that we might expect to be going on in an initialization routine. The very first instruction is a CLI, which temporarily stops interrupts, leaving whatever instructions follow unharassed by interrupts. This provision is typical of critical start-up code, which often sets the register conventions appropriate for interrupt handling.

Following the CLI is the very thing we were talking about: register loading. The next four instructions load DS, ES, and SS—three of the four segment registers. The setting of these registers is rare, *except* at the beginning of a program; furthermore it makes perfect sense that three of them would be set at once (the fourth segment register, CS, has to have been set already).

The two instructions that follow the setting of the segment registers make sense as a pair. First, a register is cleared to zero (by means of an *exclusive-or* operation upon itself), and then the resulting zero value is stored somewhere.

What we've seen in looking at the first seven instructions looks like sensible code; the instructions do coherent, reasonable things, and they fit together into small patterns. The second through fifth instructions do one thing together, and the sixth and seventh do another thing. In short, we have found all the critical signs of a proper instruction stream.

Thus we've accomplished our limited objective. We've located some code and made a modest amount of sense of it. We'd have to do quite a bit more work to decode all of ROM Basic—or even to decode a meaningful chunk of it. But we've seen how it's done, and seen that it isn't necessarily a fearsome task. ▲

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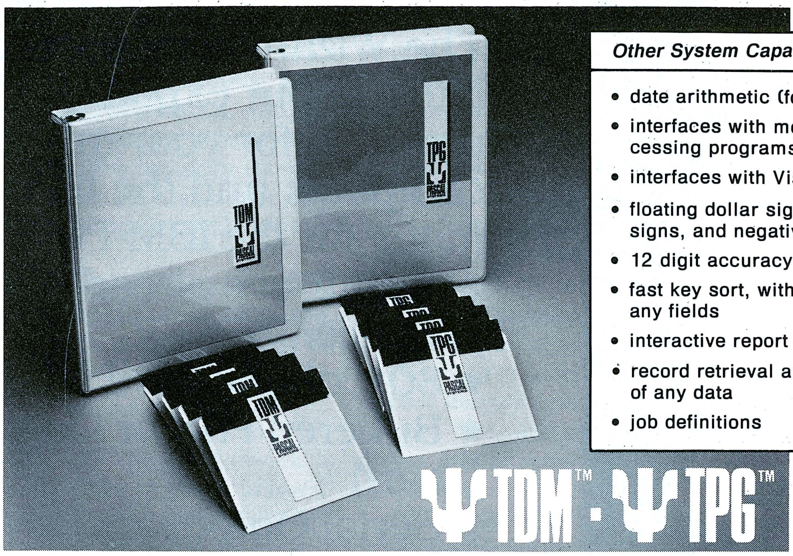

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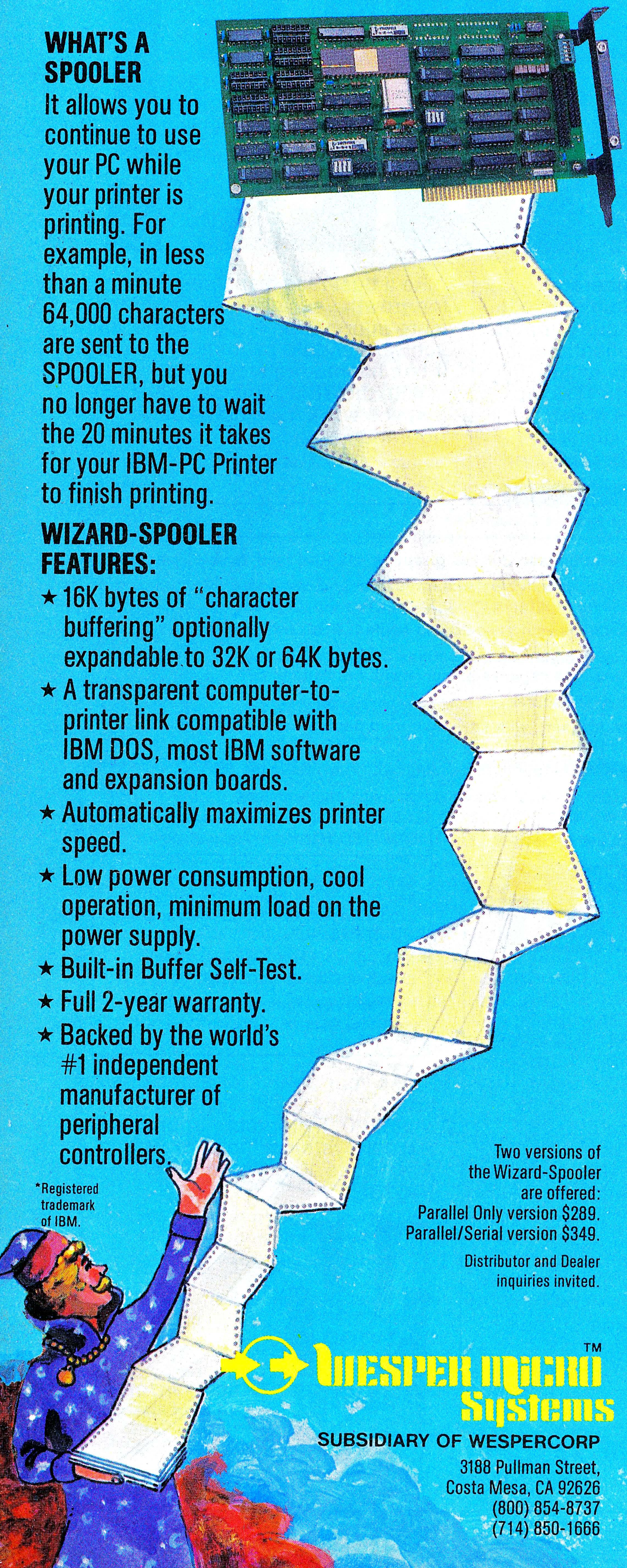

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newspeak

Δ **Aftermath.** Two months after the Us Festival, the dust has finally settled in Devore, California. The helicopters and RVs have gone away. The freeway is wide-open and free.

Not to be overly dramatic, the spirit of the festival lives on and is spreading around the world. Soon the Us Network will be operational and the spirit will travel farther and faster.

Just what is the Us Network? During the Labor Day festival it was a two-way video link-up with the Soviet Union. Festivalgoers saw a traveloguelike short about Moscow one night and live scenes from a Moscow radio station the next night. The latter consisted of three hundred Soviets gathered on a sound stage dancing to the music of Soviet group Stas.

The video feed from the Us Festival was featured one evening on the Soviet Union's only major television station, Bremja. Generally a news and educational medium, Bremja features three minutes of cultural offerings every night. The broadcast from the Us Festival was given the whole three minutes and was seen by approximately 150 million Soviets.

"It was a big event in the Soviet Union. Unheard of," said a Unuson spokesperson. "This was the first demonstration of the Us Network's capabilities for interactive communication."

The full scope of Wozniak and Unuson's intentions with the Us Network is staggering. In the years to come, universities, colleges, high schools, and special computer centers around the world are projected to be linked together with the help of computers and space-age technology.

Using a Westar satellite, educational programming, future Us Festival concerts, lectures, and conferences could be downloaded to many different locations. At first the system will consist mainly of straight video networking and will be targeted at universities and colleges.

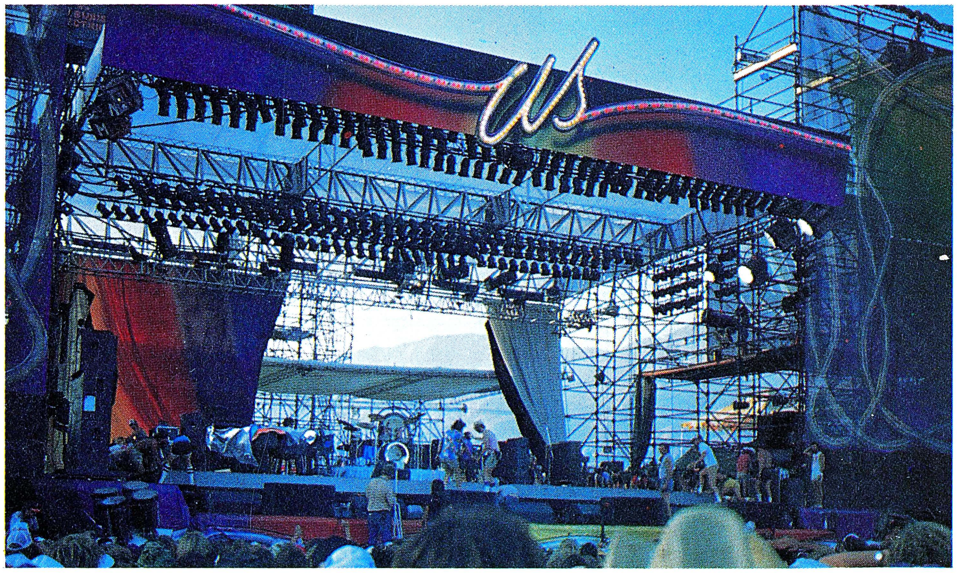
A likely scenario runs something like this: Bigtown State contracts out a network system, with the initial cost falling on Unuson. Bigtown is expected to pay back its debt with profits earned from charging admission to broadcasts of future Us Festivals. The system would also be used for sending and receiving educational programming and other services, like news.

Currently, Unuson is talking to a dozen universities on how best to set up this kind of system. Once a firm video network is established, personal computers will enter the scene to make the system more interactive. Even individual homes may someday become part of the Us Network.

The idea is to create a broader sense of community and be able to share human resources better than before. It's the feeling of Wozniak and Unuson that science and art together can help unite people and improve our worldly situation.

One additional advantage will be not always having to rely on the telephone system for long-distance interactive communications. The use of satellite technology should greatly enhance the viability of the Us Network.

There may be another Us Festival at the same location in Devore as early as Easter 1983. Regardless, the Us Network should be around for a long time and benefit an ever increasing number of people.

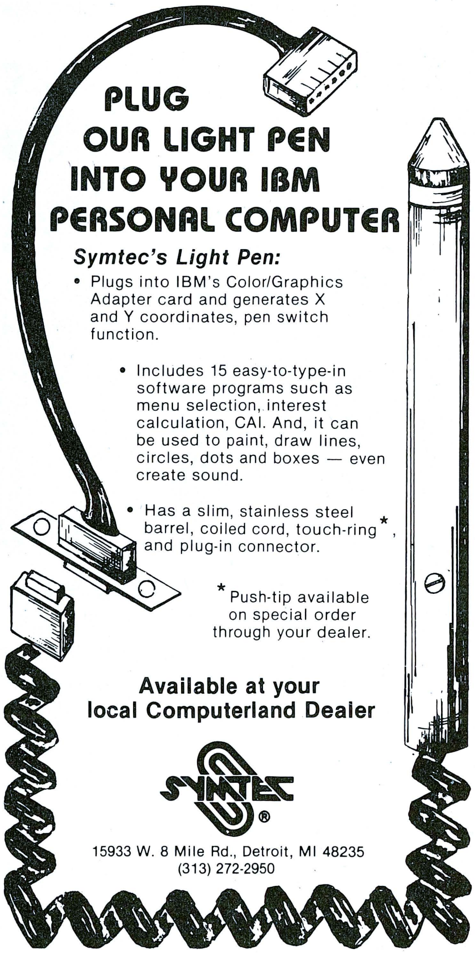


Δ **Touch-Tone Therapist.** At the Veterans Administration Medical Center in Birmingham, Alabama, the burden of follow-up care for the speech, language, and hearing impaired has been lightened a little bit—electronically. Since therapy clinicians can't make house calls, it was necessary to invent a computerized version of one that did. Its name is Remate (remote machine-assisted treatment and evaluation), the brainchild of Dr. Gwenyth Vaughn, audiologist and speech pathologist at the medical center.

What Remate does is call patients via Touch-Tone phone. It asks the patients if they are ready in a recorded voice. If a patient is, the lessons begin. This telephonic therapy (as Dr. Vaughn has nicknamed it) doesn't replace traditional face-to-face drill work with a clinician; it's designed to complement it.

Remate can provide drill work in several areas.

In speech therapy, words and phrases are repeated by the patient and then played back



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for him to hear, using the patient's own voice.

An attachment called the Telewriter permits handwriting tests, and the handwriting is modem-translated for analysis.

For stroke therapy, a patient is asked four to six questions with a measured response time. Remate can recognize whether the answer is right or wrong.

Traveling for long-distance therapy can be expensive and exhausting—both physically and emotionally. Three factors figure into a veteran getting quality therapeutic follow-up care: parking, weather, and travel, according to Dr. Vaughn.

"The average visit is 175 miles round trip per patient, and most of them try and come for daily care. The cost to travel averages forty-two cents a mile these days. Remate can save a patient about five thousand dollars a year and provide him with care as good as face to face. In fact, it's identical."

And it's vastly less expensive for the medical center as well without sacrificing the quality of the therapy. "We can save five million dollars for every thousand patients over a six-month period. That's for two sessions a week of drill work per patient."

The Remate system is a combination of micros and mainframes that work together to make Touch-Tone therapy seem easy. Hardware configurations were designed by Dr. Thomas Donald, who set up the "black box" housing the line interfaces connecting the various machines. John Kramer, computer specialist with the medical center, is the man who keeps it all up and running.

"The medical center has twelve Motorola 68000 micros that do all the talking, typing, writing, and dialing," Kramer explains. "Each one can handle twelve phone lines at a time. They're not set up yet for automatic dialing—the software hasn't been written—so the calls are made manually at the moment.

"Four Motorolas are each connected to three PT 11/22s over high-speed channels. They have operating systems that can handle multiple tasks. These machines hold the programs currently being used.

"The central computer is a PDP 1144. It handles all the evaluation and research as well as the scheduling. It has a catalog of about thirty programs, or lessons, for clinicians to choose from. Remate is only in its infancy—the PDP is set up to hold a thousand different lessons."

The prize piece of equipment in the Remate system is the TEL-plus, a Touch-Tone telephone with a device that lights up when buttons are pushed next to pictures or words. This is especially useful when treating stroke victims with aphasia, a condition characterized by understanding and comprehension within the brain but no discernible way to communicate it.

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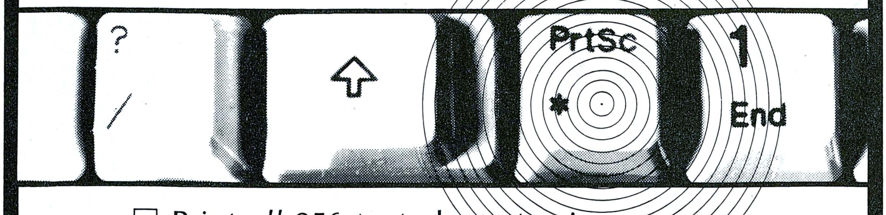

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For the last three years, Dr. Vaughn and her crew of computer specialists have been wrestling with getting Remate set up. "We kept having to get things approved, approved, and approved," she explains. Funding was handled by the Veterans Administration Rehabilitation Research Department, set up to support research, do reviews, and award projects. "We just got an award to go another three years," she notes.

"We're going to study the telephonic system versus face-to-face care. This is called efficacy testing. It's a crucial undertaking, since no actual data exists at the moment. We're confident about Remate here at the medical center, but we're going to have to prove the system really works."

To date, some eight thousand patients have benefited from clinician-assisted telephonic therapy. Remate can handle many more. As Dr. Vaughn says, "We're aiming for a nationwide VA service network for speech and hearing impaired persons. Remate could be enlarged at a very small cost." Right now, several Veterans Hospitals across the country are set up to call in and schedule their own local therapy using Remate.

"One person can monitor all the input right now," Kramer explains. "But it's hectic in a crunch, I'll tell you." And he's the one who would know—but it looks like Remate can handle the load.

∆ **Customized Taxes.** A controversial bill that exempts custom computer programs from a 6 percent state sales tax has been signed into law by California Governor Edmund G. Brown, Jr.

Industry sources say the legislation, the first of its kind nationally, could have pacesetting implications given California's traditional leadership role in technology and lawmaking. The measure, which was pushed by a fledgling software group that felt it was being victimized by a tax-strapped State Board of Equalization, upholds the industry's longstanding view that customized programs are one-time services which are not subject to the sales tax.

The California bill only applies to customized computer programs that are developed primarily for mainframes. It does not affect mass-produced, commercial software programs sold for personal computers. The latter will continue to be taxed as tangible personal property, as they are in most states.

The new measure was lobbied through the California legislature by a coalition of companies under the banner of the Software Services Association. Paul Connolly, a member of the group and the vice president and general manager of Informatics of Palo Alto, said they had sought legislative relief as a defense against the policies of the State Board of Equalization. In the past year, he says, the board slapped scores of software developers—some of whom weren't even aware of the policy's existence—with assessments for unpaid sales taxes going back from three to eight years. One firm received a back-tax bill of $285,000, he says.

The association appealed to the legislature, according to Connolly, because there was no effective administrative remedy. Assessment appeals are not heard by an independent review authority, he says, but by the board itself. State law does permit a company to sue the board in civil court, Connolly adds, but only after they've gone through the appeal process *and* paid the disputed taxes. By that time, many companies could have wound up out of business.

The bill became a hot political issue this past summer when a member of the board labeled the legislation a hundred million dollar special interest tax break for "some of the most affluent members of our society." Industry sources ridiculed the figures of William M. Bennett, claiming he was confusing sales with taxes. Connolly says it's doubtful that annual statewide sales of custom programs total $100 million, and only a portion of that would be subject to tax anyway under the board's interpretation of the regulations. "This is not a tax break," he declares. "Sales taxes are paid by the customers. All the companies do is collect the monies and pass them on."

One provision of the bill does provide a special, one-time tax consideration, however. J. D. Dotson, head of the board's business tax department, characterized as "very unusual" a condition refunding $1.2 million in previously paid sales taxes to custom program purchasers. The rationale behind the refund, Dotson explains, was that the taxes should never have been levied in the first place, because custom-designed programs are a service not subject to taxation.

Dotson, whose department furnished Bennett with his $100 million tax-loss figures, still believes that the board and his department were correct in their interpretation of the regulations. "Any manufactured article has a lot of labor and service involved," he says, "but the ultimate thing that the customer uses is a piece of tangible personal property—a machine-readable program."

According to Dotson, his department had been following this interpretation since 1975 when the board adopted it as official policy. During that time it had been enforced "equally and fairly," in line with the availability of audit staffs. In the last couple of years, however, at least according to Connolly, the enforcement has become more aggressive. Did this suggest, as some in the industry have speculated, that a money-strapped state government was casting about for additional revenue sources? Not by Dotson's lights. "There's no truth to the charge that we did it to raise money."

And now, as if to mock the notion, they have to give some of it back.

Δ **The Bank Shot.** The banking business is feeling the impact of the personal computer revolution—seven years before it thought it would. According to the report *Consumer Electronic Banking*, just issued by International Resource Development, a specialized management consulting and market research firm, the personal computer has made home banking a reality far in advance of the predictions of retail banking experts.

"Small and medium-size banks have been cozily assuming that bank-at-home wouldn't become really important until videotex systems became widespread—perhaps around 1990," says IRD study project manager Carl Frankel. "Now they see 1983 as the year in which they may lose all their remaining profitable customers, having already lost many big earners to Merrill Lynch in 1981 and 1982." Merrill Lynch, along with American Express and other "financial supermarkets," now offers various telebanking services to the consumer that compete with traditional bank offerings.

The past two years have seen an overwhelmingly positive response from consumers to the conveniences of paying bills, switching deposits, and performing other fiscal chores in the privacy of their own homes. "The average upper-income banking customer," says Frankel, "hates standing in line."

The manufacturers of specialty terminals like Micro Peripherals's Bank Box or Chase Manhattan's Telecredit Paymatic are likely to feel the effects most acutely as their market continues to erode before the advance of the home computer. Of the three million personal computers that will be in place by the end of 1983, about two million of them will be in the hands of individual consumers, says IRD. Frankel describes the specialty terminal manufacturers as "sucking their teeth" as they watch the personal computer wave engulf many of their projected markets.

Additional direct impact of home computers on banking in the near future will result in fewer tellers and smaller buildings, which will result in turn in a major reconfiguration of traditional bank investment policy. "As early as 1987," Frankel predicts, "the banking industry may become a net seller, rather than a net buyer, of top retail exposure real estate."

Having grasped the fact that the families buying home computers are the same families that have long provided the deposit base for commercial banking, Chemical Bank now has a personal computer telebanking service, "and soon Citi, Chase, BankAmerica, and other biggies will be sweeping into the market." ▲

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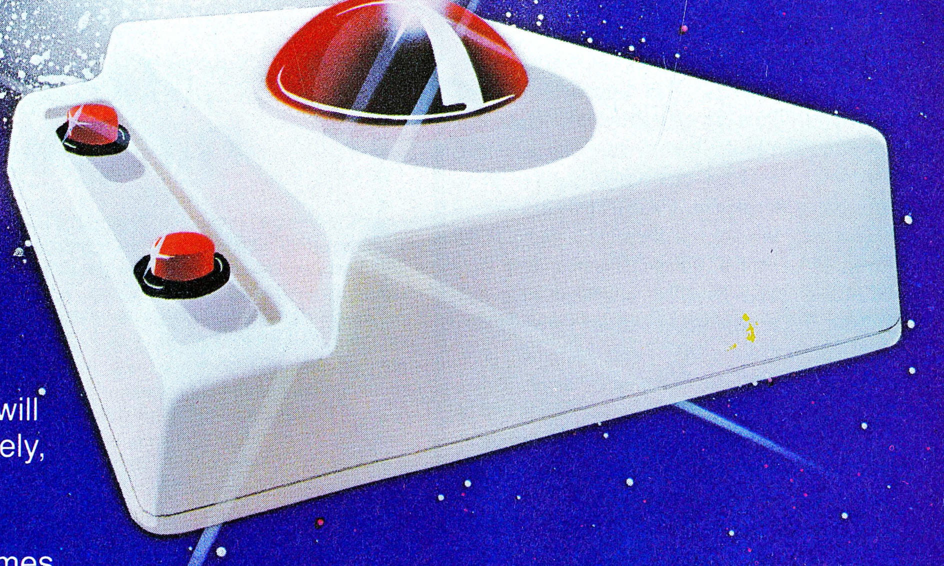

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At least that's probably how the folks at VisiCorp viewed the last few weeks. September saw *VisiCalc* regain the lead from *WordStar* as the bestselling program in the pc marketplace. And the pioneer spreadsheet opened a wider margin over *SuperCalc*, its current nemesis.

Not only that, but *VisiTrend/VisiPlot* and *VisiFile* made auspicious debuts that placed them fifteenth and seventeenth, respectively, in the Top Thirty.

The fly in the ointment is former VisiCorp product manager Mitch Kapor. Kapor, now president of Lotus Development, announced *1-2-3* for the pc, a product combining a spreadsheet, a text processor, a graph module, and a database. The Lotus software joins *MBA* as a product that dovetails text processing and database management with an electronic spreadsheet in a drive for more efficiency.

How much *1-2-3* will eat into *VisiCalc*'s market is unclear; but what must grate on the VisiCorp folks is that Kapor developed the product with a million dollars of VisiCorp's cash. Kapor is the author of *VisiTrend/VisiPlot*, which VisiCorp picked up on a royalty basis. Eventually, VisiCorp bought out the contract with more than a million dollars changing hands.

Clearly, that money has been hard at work since the sale. So it goes for hands that feed.

VisiTrend/VisiPlot was the highest-placed newcomer on the chart in September, with *VisiFile* making the second most promising debut. That makes *VisiFile* the bestselling database for the pc, but it's being hard-pressed by another list newcomer—*EasyFiler*—which was just a nose behind. *Total Information Management* seems to be holding its own, auguring an interesting race for dominance in a category where quality products are a must to validate the hardware.

Of course, *MBA* and *1-2-3* impact this area, and two other competitors are starting to make their muscle felt—*dBase II* and *Condor*.

WordStar remains the program of choice for word processing, but *EasyWriter II* continues to make gains, moving into fourth on the September list. *Volkswriter* held its own, but *EasyWriter 1.1* fell back. Other word processors continue to jockey for position.

BPI's *General Accounting* package seems to be gaining strength at the expense of Peachtree's accounting packages, with *Cyma* a respectable third.

The Infocom people continue to validate the average pc owner's interest in thinking entertainment software. They captured three positions in the top ten places, with *Zork I*, *Zork II*, and *Deadline* placing fifth, sixth, and ninth, respectively. *Microsoft Adventure*, which pioneered this genre, maintained a position in the Top Thirty at twenty-fourth.

Microsoft Decathlon was the top-selling hi-res game, rising from twenty-fourth to eighth. *FriendlyWare PC Introductory Set* continued to fare well, placing eleventh. *Temple of Apshai* rose to fourteenth.

The pc marketplace continues to grow at between 10 and 25 percent per month in terms of new software actually introduced into the market. That's in contrast to as much as a 50 percent growth in software announced. In addition to longer than anticipated development times, many of the new products are finding normal avenues of distribution relatively closed or slow moving in the adoption of new vendors, which impedes growth.

Nevertheless, the pc software market continues strong. As such other markets as Atari, Apple, and Commodore, which are more

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1st CLASS MAIL. By Bob Schoenburg and Steve Pollack. Here's a pair of authors who may be software's answer to Irving Wallace. Wallace is the bestselling author who hears the murmuring of general populace and caters to their desires. Bob Schoenburg and Steve Pollack seem to have the same trait.

Consider.

The pair brought out *Home Money Minder*, a perfectly respectable home finance package. Then they listened to the user feedback. The result was *Home Accountant*, one of the phenomenal success stories of the first half of 1982.

Around the same time *Home Money Minder* hit, the team also tested the market with *The Mailroom*. Mailroom never was the success of *HMM*, but the authors used the same technique – listen to the users and incorporate all the good ideas. The result is **1st CLASS MAIL** – a program that, incredibly enough, manages to live up to its double-entendre name.

All of the above is not to accuse Schoenburg and Pollack of putting out the programming equivalent of stalking-horses to do their market research for them. Their original efforts do stand on their own merit. They just pale next to the sequels.

1st CLASS MAIL is so well thought out and so easy to use that other publishers who call their programs "user friendly" should bow their heads in shame.

SOFTALK got an early release of the program sans documentation. Yet a rank computer illiterate was able to apply the program to two separate uses with relatively little trouble. This is high praise indeed: that a novice operator could use a powerful program with no more than the screen menus.

The program allows for twelve fields, clearly more than the traditional name and address of a mailing label. The implication is that the software can be put to other innovative uses as well. The built-in ability to sort and filter on any field or combination thereof enhances the chances that users will find multiple applications for the program.

Continental Software will actually be publishing four versions of the program.* The one already in release is for the Apple II using floppy disks. A hard-disk version will follow. Both versions are pending for Apple III as well, awaiting the development of a rapid binary sort subroutine.

1st CLASS MAIL is a first-rate program for specialized data base applications.

Reviewed by Al Tommervik, Publisher, Softalk.

***Available for: Apple II,™ Apple III™/III with Profile,™ IBM-PC™/IBM-PC with Tecmar™ hard disk/IBM-PC with Davong™ hard disk.**

Continental Software

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Los Angeles, CA 90045 Telephone (213) 417-8031

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heavily entertainment driven, look forward to bonanza Christmas seasons, it will be interesting to observe how the IBM bourse reacts.

Last Christmas, there was not a varied enough supply of software to judge the composition of the pc market. But this year, the mix is sufficiently wide to give buyers a multiplicity of choices. So this selling season will go far toward defining for software publishers what to develop.

A big sell-off of entertainment product should whet the appetites of such companies as Sirius Software, Sierra On-Line, Broderbund, and DataMost. Even a moderate increase in game sales should quicken the pace of entertainment software development. On the other hand, flat performance by entertainment software this winter will clearly signal that the pc market belongs to the VisiCorps, MicroPros, Sorcims, and Ashton-Tates.

Mitch Kapor and Lotus are betting on the latter scenario with their big investment in *1-2-3*. VisiCorp opted for that direction last year, when they sluffed off their entertainment titles.

The peripheral market will also be impacted by buyer decisions. A big entertainment Christmas implies that the plethora of RAM expansion board and hard disk manufacturers may have to revise their sales expectations downward. An awful Christmas for the gamers will give heart to those companies supplying those hardware accessories for the pc that are generally business oriented.▲

the top thirty

IBM Personal Computer sales outlets representing approximately 5.1 percent of all sales of pc and pc-related products volunteered to participate in the poll.

Respondents were contacted early in October to ascertain their sales for the month of September.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in October represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 4.9 percent, which translates roughly into the theoretical possibility of a change of 5.41 points, plus or minus, in any index number.

This Month	Last Month	Index	
1.	2.	206.15	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston; VisiCorp, IBM
2.	1.	160.17	**WordStar;** MicroPro
3.	3.	98.32	**SuperCalc;** Sorcim
4.	9.	93.56	**EasyWriter II,** Basic Software Group; Information Unlimited Software
5.	7.	63.43	**Zork I;** Infocom
6.	8.	58.67	**Zork II;** Infocom
7.	6.	49.16	**Home Accountant Plus,** Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
8.	24.	47.57	**Microsoft Decathlon,** Microsoft/Tim Smith; IBM
9.	19.	45.99	**Deadline;** Infocom
10.	29.	42.82	**Typing Tutor,** Michael Sierchio (Dick Ainsworth and Al Baker); IBM (Microsoft)
11.	4.	41.23	**FriendlyWare PC Introductory Set;** FriendlySoft
12.	13.	38.05	**General Accounting,** John Moss and Ken Debower; BPI
13.	15.	31.72	**Macro Assembler,** Microsoft; IBM
14.	22.	30.13	**Temple of Apshai,** Jeff Johnson, John Freeman, and J. W. Connelly; Epyx/Automated Simulations
15.	21.	28.54	**MBA;** Context Management Systems
	—	28.54	**VisiTrend/VisiPlot;** VisiCorp
17.	—	26.96	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman; VisiCorp
18.	5.	22.20	**Asynchronous Communications Support;** IBM
	—	22.20	**EasyFiler,** Basic Software Group; Information Unlimited Software
20.	14.	20.62	**MailMerge,** MicroPro
21.	19.	19.03	**Fortran Compiler,** Microsoft; IBM
	26.	19.03	**Total Information Management;** Innovative Software
23.	22.	17.44	**Floppy Frenzy;** Windmill Software
24.	10.	15.86	**Microsoft Adventure,** Gordon Letwin (Will Crowther and Don Woods); IBM (Microsoft)
25.	10.	12.69	**Basic Compiler,** Microsoft; IBM
	16.	12.69	**General Ledger;** IBM (Peachtree Software)
	—	12.69	**Pig Pen,** TMQ Software; DataMost
	—	12.69	**Astro-Dodge,** Dave Gangola; Digital Marketing
29.	17.	11.10	**Crosstalk,** Microstuf
	25.	11.10	**Volkswriter,** Camilo Wilson; Lifetree Associates
	27.	11.10	**Personal Finance Program,** Kenneth Petersen; Best Programs

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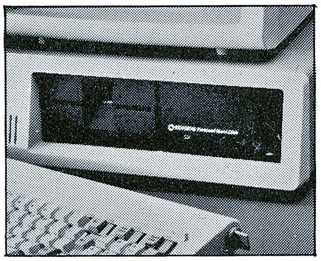

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